



FRIDAY, JULY 27, 1877.

The Waters Feed-Water Heater for Locomotives.

Our engraving represents a feed-water heater which has been applied to a number of locomotives on the Old Colony, and, we believe, on some other railroads. Fig. 1 represents a locomotive with the heater attached, and fig. 2 the heater itself with part of the outer case removed. It consists of a series of what the inventor calls "concave plates," of which the two upper ones are shown in section in fig. 2 at A. These plates are made of steel riveted together at the outer edges, and having a large centre opening where the two adjacent plates are bolted together by long bolts. These plates are enclosed in a case, D, and the cold feed-water is forced by the pump or injector through the pipe B to the inside of these plates. The

MASTER MECHANICS' CONVENTION.**Discussion on Wiping Engines.**

Under the rule devoting a certain time out of each day's session to the asking and discussion of questions, the following question was submitted:

Does it pay to wipe locomotive engines in general use?

Mr. FAY had had an opportunity of seeing engines treated in the usual way and also some that were run without any wiping at all. By discharging the wipers the amount of their wages would be saved, unless a loss was caused by any consequent damage to the engines. There was a general impression that wiping an engine saved wear and cutting of the bearings. He did not see how that could be, as the wiping affected only the outside of the engine and touched none of the wearing parts except the links and guide bars. Of course the care bestowed on the engine by the engineman made a great difference; an engine would do better when well and intelligently cared for, but this depended largely upon individual character. He thought that they had hardly facts enough to go upon in discussing this matter.

Mr. JEFFREY said that the Philadelphia & Reading road was trying the experiment of dispensing with wipers. They had 410 engines and the saving in wages was \$285 per day. This amount they proposed to use as a sinking fund to cover any depreciation that might result from not wiping the engines. The result could only be told after a trial for some time.

with master mechanics was to have all the work that was necessary done, and done in the best way.

Mr. WHITE did not see how it was that on some roads the cost of repairs was reported as low as 2½ cents per mile run. He could not get along with less than 5 cents per mile, and he did not see how anyone could keep repairs down to 2½ cents, if they charged everything to the locomotives.

On motion the discussion was closed.

BRICK ARCH IN FIRE-BOXES.

The next question was: What are the advantages of the brick arch as ordinarily used in locomotives?

Mr. SEDGLEY said that he had changed his views on this point. Recently he had taken out the arch from one of his engines and found that it ran with much less fuel without the arch.

Mr. HAYES said that they had used the brick arch for several years in most of their passenger engines and had found a saving of about 7 per cent. in fuel. As an offset, however, it was very destructive, causing the fire-boxes to leak and stay-bolts to crack, so that the extra repairs were about equal to the saving in fuel. An advantage on passenger engines, however, was that there was much less smoke when the arch was used.

Mr. SEDGLEY asked how Mr. Hayes built his arches.

Mr. HAYES said that they put it next the flue sheet, standing off some two or three inches so as to let any deposit thrown over drop back on the grate. The side-sheets for a fire-box with brick arches are made very carefully. They are placed

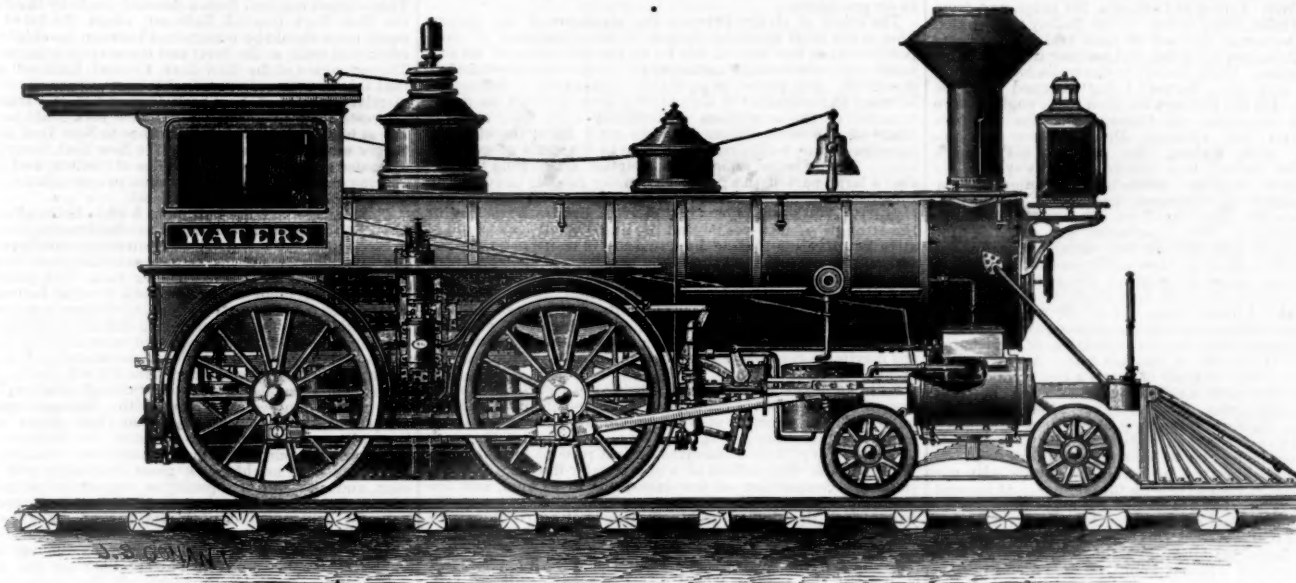


Fig. 1.

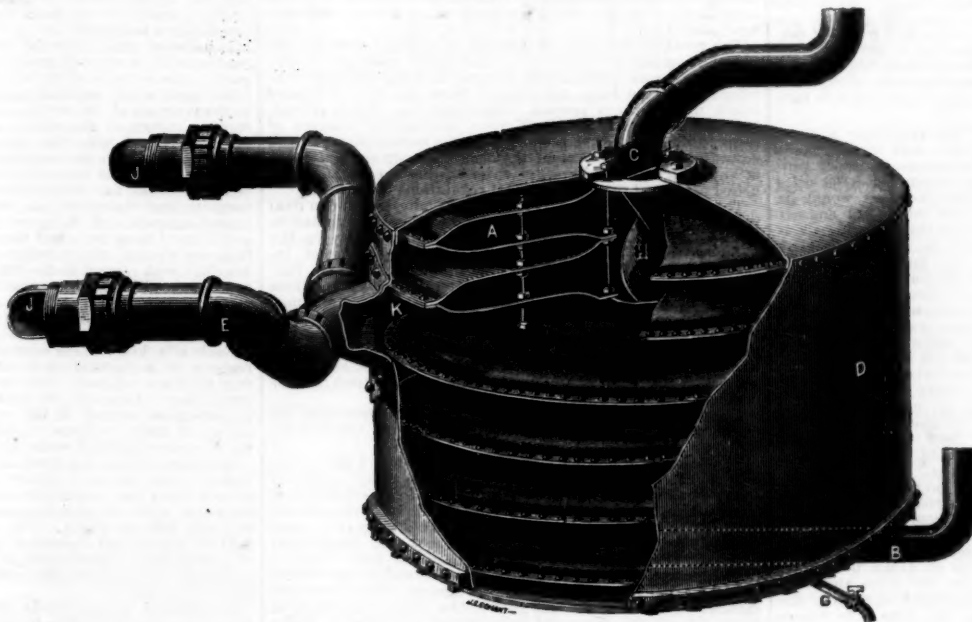


Fig. 2.

exhaust steam is taken from the exhaust pipes of the locomotive, by pipes, E, which have spoon-shaped extensions, J J, which take in a portion of the exhaust steam to fill the case D, containing the plates A. The latter are therefore surrounded with exhaust steam, and the cold water on the inside is thus heated. No provision is made for the escape of the steam from the case or jacket, it being intended merely to keep it full; but a cock, G, is attached at the bottom, for the escape of the water of condensation. The "spiral core," H, is intended to cause the water to flow outward to the extremities of the plates, and thus facilitate the heating of it.

The manufacturers claim a saving of 15 to 20 per cent. in fuel by the use of this apparatus. In the *Railroad Gazette* of Sept. 11, 1875, we published some estimates of the amount of economy theoretically possible by the use of feed-water heaters, which indicated that by heating feed-water from 40° to 220° before it enters the boiler all the economy possible is 15½ per cent. We are therefore inclined to believe that the latter figures of the manufacturers' claim are somewhat too high.

Mr. TAYLOR, Master Mechanic of the Old Colony Railroad, who, as stated, has a number of these heating apparatus in use, speaks very highly of them, and any one interested in the subject may get further information from him or from the Waters Locomotive Heater Company, West Meriden, Conn., which is manufacturing the heater.

Mr. FRY moved that further discussion be dispensed with, as so few facts could be had on this point. Which was carried.

ROUND-HOUSE REPAIRS.

The next question was: What proportion do the round-house repairs bear to the total cost of the repairs on engines?

Mr. FRY said that on his road the round-house repairs were 26 per cent. of the whole. With a theoretically perfect engine every part would wear equally, but there was a great difference in engines and in the attention paid to details on different roads. On some roads, for instance, the brasses ran much longer than on others. A comparison of experiences would be very interesting on this point. He believed, however, that 26 per cent. would be nearly a fair average of the cost of these repairs.

Mr. SPRAGUE thought that this was a new subject and an important one. It should be given to a committee to collect facts and prepare a report for next year.

Mr. WELLS said that there was a great difference in the practice of different roads. Before they could come to any definite conclusion in this matter they must adopt a platform or basis to distinguish between what were properly round-house repairs and what belonged to the machine shop.

Mr. FORNEY, in answer to Mr. Sprague, said that this proposing of questions was intended for the very purpose of bringing out new subjects and getting experiences and opinions on points not included in the regular committee reports. The discussions of these questions might lead to valuable suggestions and conclusions.

Mr. FAY agreed that it would be well to get at some definite basis in this matter, and to determine to what extent machinery should be used in the round-house. The important point

at an angle and the brick slid in on the curves or grooves, with a key in the centre. It is free to move, but so placed as not to throw undue strain on the sheets.

Mr. FORNEY asked if engines with the arch steamed more freely than others with a heavy train or on a grade.

Mr. HAYES did not think there was much difference, but with a light train the engines that had the arch steamed more freely.

Mr. FRY said that on the Pennsylvania they used the brick arch for both passenger and freight engines, but he did not know that any experiments had been made to determine the saving, if any. They had noticed, however, that without the arch the engines threw out more smoke and sparks. The arch prevented that to a great extent. Their arches were supported on water tubes running from the throat sheet to the crown sheet. These tubes gave very little trouble and there was no strain thrown on the side sheets.

Mr. JEFFREY said that they had different results from the arch. On the Iowa Division they used a very light coal, evaporating 3.77 lbs. of water to the pound of coal. They had short, deep furnaces, as for a wood-burner, and the brick arch was no use, except to prevent smoke. With larger furnaces and different coal there was a benefit from the arch, especially with the La Salle coal, a slower-burning coal, which evaporates 4.75 lbs. of water to the pound of coal. The trouble they had with the fire-boxes was from leaking around the stay-bolts below the arch, and from cracking of the stay-bolts.

On motion the discussion was then closed.

LENGTH OF LOCOMOTIVE RUNS.

The next question was: What is the greatest length of run that is economical for freight engines?

Mr. SEDGLEY said that the divisions of their road varied from

88 to 143 miles. He preferred a run of about 120 miles, but 143 miles made a very convenient run. He preferred 120 miles for at least six months in the year, but for eight months they ran 143 miles with freight. He saw no injurious effect from the longer run. It kept one man on an engine, not changing about.

Mr. PEDDLE thought that 150 miles was about the limit of endurance of the men running the engine. That made about a 12 hours' run, which was all a man could well stand. Changing the men was bad for the engines.

Mr. JEFFREY said that he had spent some time investigating the matter on the New York Central and the Pennsylvania. In September the New York Central had been trying the long runs about three months, with an average of 63 engines per day running between Albany and Buffalo. With 63 engines on this run of about 300 miles, an average of 10 engines per day were out about the middle of the run, either for lack of trains or for repairs. The exact average out was 9½ engines per day for 90 days. The men were changed at the middle of the run from the freight engines to the passenger engines, running from Albany to Syracuse and then back again, 300 miles in all. Then the men were changed, the first going behind. On the Pennsylvania they had 25 engines running between Altoona and Harrisburg, with 42 sets of men and the men changing at each end of the run. They were running in that way as an experiment. On the Illinois Central they had also tried the long runs in the latter part of 1876. They then began to run their engines from Amboy, Ill., to Waterloo, Ia., 210 miles; from Amboy to Centralia, 268 miles, and from Chicago to Centralia, 252½ miles. From Amboy to Waterloo some 30 engines were run, one set of men taking the engine from Amboy to Dubuque, 117 miles, and another from Dubuque to Waterloo, 93 miles. From Amboy to Centralia four engines were put on the long runs, the men being assigned to these indiscriminately. On the Chicago Division three engines were taken, the men changing at Champaign. On the passenger trains on the Chicago Division four engines were assigned, each making the run of 252½ miles every day, there being two trains each way. Some of the passenger engines made 7,795 miles in a month. The same arrangement was made with passenger engines on the other divisions, two sets of men being assigned to each engine. The experiment was continued for six months with the freight but only two months with the passenger engines. They came to the conclusion that the cost of repairs was about the same for runs of 200 as for 100 miles. The engineers, however, disliked very much to change their engines and he did not blame them for it. It was very disagreeable to change in this way and an engineer was not willing to take any responsibility for the condition of an engine which had been in the hands of another man. At the end of six months they found an increase of nearly a cent a mile in the cost of fuel and of 0.16 cent a mile in oil and waste. The cost of cleaning the engines was much less, but, after making allowance for wages, the total cost was 0.33 cent per mile more than with the old way of running, repairs not being included. The difficulty of not being able to hold the engineers responsible might have been obviated by opening accounts with the engineers individually, instead of with the engines. At the end of six months, however, they abandoned the experiment.

Mr. SIMONDS thought that an engine could make its trip on a long run with less fuel, because there would be less detention and waiting at division stations. For the same reason there should be less loss of oil. There would be less waste in running back and forth to the round-house, making up and so on.

Mr. JEFFREY said that they found a great difference on different sections of the road. They had a very good set of men on the road and they generally entered into the experiment, but on the run from Amboy to Waterloo the men were not satisfied, because it made their run somewhat longer. It was very cold in Iowa also, and they had trouble from the ash-pans freezing up. Apart from all these considerations, if you run your engines twice as far without laying off, you ought to save in fuel.

Mr. FORNEY said that this question was attracting a great deal of attention among managers. There was another point to be looked at. Mr. Jeffrey stated the increased cost of running at 0.33 cent per mile. Now if an engine ran 7,000 miles per month, 84,000 miles per year, the increased cost would be \$280. But with the shorter runs twice the number of engines are needed, and the cost of an additional engine being about \$8,000, the yearly interest on that would be \$560, so that we would have a net saving of \$280 from the long runs, less the incidental expenses. This question of interest is an important one and had not had the consideration it deserved.

Mr. SIMONDS believed that the mileage of engines could profitably be increased. As to the engineers he thought that there would be no trouble, if care was taken to employ only competent men and to secure their good will and co-operation. He had never found any trouble; his men were always willing to make longer runs when it was necessary. Most men did not like to change their way of doing things, but you could generally make them see an improvement after a time. On the Missouri Pacific they had lengthened their runs some years before, making only one change between St. Louis and Atchison.

Mr. HEWITT said that their runs were pretty long, but each man kept his own engine; they had never tried changing them. Formerly their runs had varied from 80 to 125 miles, but in making some changes they had concluded to discontinue two of the lesser shops and concentrate the work at Sedalia. Their passenger runs were from St. Louis to Sedalia, 190 miles, and from Sedalia to Atchison, 150 miles, and they had five engines to run four trips. The object in making the change was not so much to lengthen the runs as to secure greater convenience and economy in the shops. The arrangement had worked very well and had given them no cause for complaint.

Mr. WILDER asked who was held responsible when the men were changed during the run.

Mr. JEFFREY said that the engine should be inspected and any needed repairs reported whenever the engineer was changed. If these long runs could be adopted there would be a saving in the amount invested in locomotives, and also in engine houses. There would be less loss from engines rusting when laid up, and the engines would be kept better oiled, being more continually in service. With more cleaning there would be less wear to the guides and links, and there would possibly be less strain to the boiler from expansion and contraction.

Mr. FAY said that on the division between Altoona & Harrisburg, where the experiment had been tried of running the engines indiscriminately as to engineers, the Superintendent believed that it was no longer an experiment, but that there was a saving in every way. The engines make from 4,000 to 6,000 miles per month and the men have sufficient rest and are not worn out, but have time to take sufficient care of the engines. There was no intention of abandoning the system; it had worked well on a trial in the year when traffic was the heaviest.

Mr. PEDDLE had heard that the system had failed on the New York Central, and had been the cause of loss and trouble. He would like to know more about it.

Mr. SHAFER said that on the division of the Pennsylvania referred to (Harrisburg to Altoona) the engines ran about 180 miles. One thing to be considered was that engines did best with one quality of coal and water, and that, on many roads, a very long run would oblige them to use different kinds of coal and water, and might produce bad results in that way.

On motion the discussion was then closed.

The Competitive Forces Which Exert a Controlling Influence Over the Movements of the Internal Commerce of the United States.

(From the First Annual Report of the Internal Commerce of the United States, by Joseph Nimmo, Jr., Chief of the Division of Internal Commerce; being Part Second of the Annual Report of the Chief of the Bureau of Statistics on the Commerce and Navigation of the United States.)

(CONTINUED FROM PAGE 327.)

PRACTICAL DIFFICULTIES IN THE ADJUSTMENT OF COMPETITIVE RATES.

Ten years ago the trunk lines connecting the Western States with the Atlantic seaboard exercised very much more influence in the determination of freight-rates than they do to-day, and for the reason that railway extensions and railway combinations of various sorts, in connection with the competition of markets, have introduced an almost innumerable number of conflicting and ever varying conditions. The great trunk lines are to-day unable to secure such rates for their competitive traffic as they deem to be remunerative. Competition has run wild. A few years ago the freight-agents of the trunk lines were accustomed to meet together and adjust through rates very much to suit their own ideas, but the difficulties of making such compacts have increased year by year, and when entered into it has been found more and more difficult to carry out their provisions.

The spirit of rivalry between the managers of the various lines is the most apparent obstacle to the adjustment of competitive rates, but behind this lie all the difficulties of an economic and commercial nature which have been hereinbefore described. Any proper or equitable adjustment of differences between the managers of several rival lines involves the determination of the conditions surrounding each line, and the limits of the competition between rival lines; therefore no agreement can ever be reached except in the spirit of compromise. The principal difficulty in practice arises from the fact that a large part of the power of making rates is intrusted to the discretion of hundreds of freight-agents throughout the country. The result of this is that when a railroad war begins the struggle soon passes beyond the limits of all system and of all order. Rates fall below the actual cost of transportation, and the contest goes on until the law of necessity compels the various railroad managers to resume the functions of their offices, and to take the management of traffic into their own hands through the forms of new agreements as to rates. But the cause of the difficulty still remains, and the contest soon begins again, and runs through the same downward course to the inevitable result—ruinous rates, followed by another agreement.

Railroad managers who once expected to secure a large degree of control over the commerce of this continent, seeing the failure of their attempts at combination, are earnestly endeavoring to devise some general plan by means of which they may be enabled to protect themselves against ruinous freight-rates. Wherever the competition of a cheap water-line exists (especially the competition of the lakes, the Erie Canal, and the Hudson River, or of the Mississippi River and its navigable tributaries), the difficulties of effecting railway combinations become almost insuperable with respect to all the lower classes of freight.

In the extreme Western States, and in all thinly populated sections of the country, where there are few competing railroads, freight-rates are more easily maintained, but even there the effect of the competition of rival markets sets limits to certain classes of freight-charges beyond which the railroad manager cannot go.

The greatest sufferers on account of railroad wars are the railroad companies themselves. The public interests are also in some measure prejudicially affected thereby, although individuals may reap large advantages from the very low rates which may at times prevail. Experience has clearly proved, both in this country and in Europe, that sudden changes of rates without notice are prejudicial to the public interests, and accordingly the requirement that due publicity shall be given of any contemplated change of rates has become a well-established feature of the governmental regulations of railroads.

The correction of the evils incident to contests between rival roads has deeply engaged the attention of railroad managers as well as of persons viewing the matter solely in the light of the public interests. When, through careful investigations of all the conditions surrounding them, the railroad companies shall have clearly determined their relations to each other and to the commerce of the country, we may perhaps see a plan devised which, without strangling competition, will enable the roads to protect themselves against themselves, in so far as to prevent the recurrence of those destructive wars which are in the face of all the economies, and which are simply the result of an abandonment of all method in their dealings with each other.

The difficulties attending the formation of agreements between railroad managers as to competitive traffic are thus described by Mr. Fink:

"In case the interested parties come together, a day or two only is generally set aside to transact business which is often of a very conflicting nature, arising from the direct conflict of so many interests. For want of time the work is often imperfectly done, if done at all. In case of disagreement there is no one to decide between the parties. The majority cannot and ought not to dictate to the minority. The result, in many cases, is that the questions at issue remain unsettled and no agreement can be made. But assuming that an agreement is at last consummated, the most difficult part of the work remains to be done. How is the agreement to be carried into effect? There is no authority to compel adherence to it; no court in which the violator of it can be held responsible. The agreements hastily formed are often understood differently by the different parties and executed in the various ways in which they are understood."

The history of the contests for through traffic which have been waged between the various trunk lines connecting the Western States with the Atlantic seaboard is but the story of competition outrunning combination. Agreement after agreement has been made between these lines and their western connections but each agreement has gradually passed out of existence through successive lapses of good faith or through conflicting views with regard to innumerable traffic interests. The end reached in each case has been the inevitable railroad war. After many unsuccessful efforts the conclusion was finally reached by the managers of the great trunk lines between the East and the West that the failure of their efforts at combination was due to the fact that the combinations did not include the more important lateral and connecting roads throughout the West. In order, therefore, to unite in one agreement all the supposed competing interests, a convention of railroad managers was held in the month of August, 1874, and there was formed what is generally known as the "Saratoga compact." This attempted combination utterly failed of its object. The managers of the great trunk lines, viz.: the Grand Trunk Railway and the Baltimore & Ohio Railroad, refused to give in their adherence to the proposed union, apprehending that the operations of the compact would be unfavorable to their interests.

At a subsequent meeting of railroad managers the astute President of the Baltimore & Ohio Railroad, looking beyond the mere question as to the differences existing between the companies, in expressing his dissent, said that "if the four great trunk lines should join in that organization, with the

power which they could exercise over connecting lines, it would be regarded by the people as a combination against their interests; and as the result there would be a combination of the people against the railways of the country; and through the courts, which are the exponents of the conscience and interests of the public, and through the representative of the people, in legislatures and in Congress, hostile action would be induced, which would more than counterbalance the advantages which would flow from the increased rates which would be commanded through so powerful an organization." The late President of the New York Central Railroad is said to have expressed the opinion "that there was much force in this view."

The Saratoga compact was signed by the officers of a large number of railroads in the Western States, and two boards of commissioners were appointed, one at the East and another at the West, charged with the duty of determining rates in each direction.

But the two boards were impotent from the very beginning. No edict of theirs was ever regarded as of the least authority, and in the course of a few weeks the compact quietly passed out of existence. Since that time the great trunk lines have been in a state of almost constant warfare in regard to competitive traffic.

For nearly eight months of the year 1876 the fiercest, the most determined, and perhaps the most wasteful contest ever known in the history of railroad management was waged between the trunk lines connecting the West with the seaboard. This contest resulted from a demand made by the President of the New York Central Railroad, about the 1st of May, that equal rates should be maintained between the chief commercial centres of trade at the West and the several Atlantic sea-ports. The managers of the New York Central Railroad maintained that this was the only practicable basis upon which the commercial interests of New York City and of the transportation interests of the lines centering at New York could be protected. It was held that the greater distance to New York than to Baltimore was counterbalanced on the New York Central Railroad by easier grades, superior facilities of roadway and equipment, and the cheapness of transportation in consequence of an enormous traffic, both through and local.

The managers of the Baltimore & Ohio Railroad maintained, on the other hand, that the assumed disadvantages of their line in consequence of being obliged to overcome the heavy grades of the Allegheny Mountains, were counterbalanced by the advantages of a shorter line and cheaper fuel. The position taken by the management of the New York Central Railroad in this matter was perhaps a rough mode of striking a general average as a settlement of many perplexing difficulties which had vexed the adjustment of through rates for more than ten years.

The equality of the Atlantic seaboard centres, with respect to the vast and varied commerce of the United States, is perhaps as much of a problem as is "the railroad problem" itself. A rule establishing equality among the four principal Atlantic sea-ports with respect to a point in Ohio might work great inequality with respect to a point in Michigan or to a point in Missouri. A rule establishing equality with respect to wheat might work great inequality with respect to corn, and the rule of equality in regard to neither corn nor wheat might apply to cotton, to provisions, to tobacco, to live animals; or to any other of the staple products of the West. A rule allowing equal rates of profit to each one of the trunk lines would cause each one to charge a different rate, based upon the actual cost of transportation per ton per mile. This would tend to throw all or nearly all the competitive traffic upon the road which could carry freights at lower rates than any one of the others, and in the course of time that road might be able to break down competing lines and to become practically a monopoly.

Equality of rates, in so far as it relates to the interests of the roads, might work very great and damaging inequality in regard to the interests of the various seaboard cities, and, on the other hand, a rule establishing equality of rates with respect to the interests of the cities might have the effect of bankrupting certain of the roads and of building up the traffic of other roads, and thus the principle of equality might in the end seriously injure the commerce of certain cities in so far as they are dependent upon trade between the West and the seaboard. Boston has western trade for which Baltimore cannot compete and Baltimore has western trade for which Boston cannot compete, and between the limits of the commercial activities of these two cities there is a broad field for competition, every point within which presents different commercial bearings with respect to the different centres of trade. Perhaps a general, although somewhat indefinite, expression of the rights of the several Atlantic sea-ports with respect to trade might be formulated thus: *Equality where conditions are equal, and preference where special advantages exist.*

Each city has certain advantages over all other cities with respect to trade, and each railroad has certain advantages over all other railroads with respect to transportation. The enforcement of any rule of equal rates, from all points within an extensive section of the country to the seaboard, on all classes of traffic, without regard to destination, would be in the face of established commercial principles.

It is impossible to lay down any general rule for securing the ends of equal and exact justice with respect to the operations of each trunk line, and the interests of each one of the Atlantic sea-ports, since the circumstances surrounding each road and each city differ so widely. The subject presents a very broad field for inquiry and discussion, and emphasizes the importance of establishing commissions or other agencies through which each State and each city may enter upon the study of its commercial interests.

Remedies of various kinds have been proposed for the purpose of meeting difficulties in particular cases. The following plan of action is suggested by the board of railroad commissioners of Massachusetts:

"The business community of Boston should combine to offset the combination of the railroads. They should deal with that line which offers them equality, and thus compel others to do the same. Should they take this course, throwing their business unitedly through the action of their boards of trade and exchanges in favor of one line as against another, recent experience shows clearly enough that the desired result would soon be accomplished. In this respect the legislature can do little; the business community, if it really chooses to organize and help itself, can do much."

This is a legitimate mode of protecting the commercial interests of a city, sound in ethics and proper where practicable. Whether it be the wisest and most practicable line of action or not, it is certain that the merchants of Boston can do much by the power of associated effort, and very much by the force of capital and individual enterprise and by a proper use of all the means placed within their power, and the history of that city leaves no ground to apprehend any failure in this regard.

The measures which should be adopted for protecting and promoting the commercial interests of each one of the Atlantic sea-ports must be determined mainly by its merchants. At this time, when the equipage of commercial movements is so delicate, it behooves those whose interests are allied to the commercial interests of each city to realize the fact that vigilance is alike the price of safety and of success.

Since the failure in practice of the efforts which have been put forth by the railroad companies to maintain rates, freight charges have gradually fallen, and cheap transportation has

* Report of Massachusetts Railroad Commissioners for 1876, page 70.

been attained through the unrestrained action of competitive forces.

The fact of the general reduction of freight charges on the great trunk railroads during the last ten years, and the practical attainment of what even four years ago would have been regarded as meeting the demands for cheap transportation, has not settled all the difficulties connected with our railroad system. The railroad companies exercise a certain range of discretionary power within the limitations already referred to, and it is possible for them so to adjust both "through" and "local" rates as to depress the interests of one city and to advance the interests of another.

Discriminations may also be made against the interests of States and of the whole country. The influence of discriminations may be appreciated from the fact that oftentimes a difference of one or two cents per hundred pounds turns traffic in one direction or another. Discriminations as they apply to cities and States call for special investigations and for special remedies.

In the struggle for a high place or for supremacy, each commercial city stands alone from the very exigencies of its geographical position, its transportation lines and its general interests. Every avenue of transport upon the land and upon the sea is its servant and the field of its commercial activities is the world. It has been aptly said that "commerce has no cousins, and that it always moves toward profits." Evidently no two cities can be very closely allied in their commercial interests. Those interests may in many cases be correlative, but they can never be in the nature of a partnership, for to a certain extent each commercial city is the rival of every other commercial city; but this rivalry is the soul of enterprise, and it is compatible with the fullest, the freest, and the most generous competition.

Many of the difficulties which environ the railroad problem, in so far as relates to the conflicts between the rival trunk lines, are due to the fact that the managers of those lines have not adopted measures for arriving at a common understanding as to the cost of transportation under the different conditions hereinbefore alluded to, the circumstances which mark distinctions between "local" and "through" traffic, the competitive character of different commodities and classes of commodities, the sources and destination of traffic, and the relations which, in the nature of things, exist between railroads and the commercial cities whose interests they chiefly subserve.

Railroad managers have, for the purpose of marking the distinctions between different classes of traffic and rates, adopted certain terms, such as "local traffic," "through traffic," "arbitrary rates," "joint rates," "competitive rates," "non-competitive rates," etc. But in practice wide differences of opinion exist as to the application of these terms. Traffic which one railroad might consider "local," and therefore be inclined to give to it an "arbitrary rate," may be considered by another road to be "competitive traffic," and a demand be made for a "joint rate," or that the rate on the former road shall be in some respects conformed to the rate charged by the latter.

It will never be practicable for the railroads to reach an adjustment of all points touching their conflicting interests and the interests of rival markets, with the precision of a mathematical demonstration, but it is believed that very many differences which produce disastrous results to the railroads without benefitting the public might be determined upon general principles as clearly as are the conflicting interests of individuals in their social and commercial relations, through distinctions entrenched in the fundamental principles of law and administered by the courts of justice. The railroad companies possess the means of supplying much of the information necessary to the attainment of this end, and it is a matter of the highest importance that they should collect the data requisite for a proper elucidation of the whole subject of the economy of transport by rail. Interest and duty here seem to point in the same direction.

An attempt has thus been made to elucidate and to emphasize the fact that the discretionary power exercised by the managers of railroads with respect to freight tariffs is confined within certain limits imposed by forces of transportation and of trade beyond their control; that these restraints upon freight charges apply especially to "through" or "competitive" traffic, and that railroad companies are also to a certain extent limited as to their "local" or "non-competitive" traffic by the same causes, acting, however, more remotely and less effectively. It has also been shown that these restraining and regulating forces operate in widely varying degrees; in certain cases compelling companies to carry freights at an absolute loss, or at very low rates, and in other cases exerting an influence so feeble and uncertain as practically to allow the companies an almost unlimited discretionary power in the establishment of both through and local freight tariffs. These varying conditions present to each commercial city and to each railroad company a separate "railroad problem," the elements of which are specific wants and specific experiences. The determination of the conditions surrounding each city and each transportation line is a work especially devolving upon those whom interest and duty alike impel to the task. The subject is vast in its extent, and it runs into the consideration of conflicting interests which cannot possibly be treated of in this report.

COMMERCIAL TRAVELERS.

A statement in regard to the competitive forces affecting commercial movements between different sections of the country would be incomplete without noticing the results of the system of employing commercial travelers. This comparatively new agency of commerce has not only introduced important changes into the etiquette of trade, but it has been the means of developing new commercial movements and of greatly extending the limits of the commerce of the various cities. Twenty years ago the commercial traveler was regarded as a sort of privateer upon trade, and this reputation undoubtedly caused his operations to be lacking in some of the essential characteristics of legitimate business transactions. But as the avocation has increased in importance it has advanced in dignity, and an almost opprobrious appellation at first applied to those engaging in it has been exchanged for one more befitting the occupation. This new agency of commerce is now seen to be a natural outgrowth of the facilities afforded by railroads and telegraphs.

The soliciting of orders and selling by sample in the hands of the agents of business houses has become an established method of intercourse between buyer and seller. The old habits of trade have been abandoned and the commercial traveler has of necessity become more closely identified with the interests of the business which he represents. From the force of competition between those of his own vocation he has been obliged to acquire a knowledge of the state of markets in all parts of the country and of other conditions vital to the interests of trade. Almost every conceivable article of merchandise is now sold through this agency, and purchases of raw material are extensively made in the same manner. The economies of this mode of commercial intercourse are obvious. Buyer and seller are thus brought closer together, losses through bad credits are reduced, trade is extended, competition is rendered more active, collections are more promptly made, interest on capital is saved, and the expenses of the great body of retail dealers are reduced.

Every sale made by the commercial traveler tends to promote the prosperity of the city in which his business house is located, and to extend the commercial influence of that city. This creates competition with other commercial cities, and forces transportation lines to provide the requisite facilities to meet the new demands of trade. At the present time there are very few manufacturing or commercial houses in this

country which do not employ one or more commercial travelers, and it is an indisputable fact that the energy, tact and persistency of these men have much to do in determining the direction of the commercial movements of the day.

Besides, all the railroad companies and freight lines have in their employ agents at almost every commercial point who are actively engaged in soliciting freights. This also tends to multiply and to complicate the elements of competition.*

* Two or three expressions in the foregoing remarks in regard to commercial travelers have been adopted from an interesting article upon the same subject which recently appeared in the New Orleans Times.

Contributions.

Railroad Ticket Accounts—The Return Ticket Department.

(From a forthcoming work entitled "Railway Revenue and its Collection," soon to be published.)

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[Continued from page 331.]

This little department is subordinate, like the traveling auditors, to the Local Treasurer.

The object of the department is to see that the revenue from every ticket returned by conductors is duly accounted for to the company.

As an auxiliary arm of the treasury department in the collection of receipts and the prevention of imposition, it is at once efficacious and economical.

It is an absolute protection against the introduction and continued use of duplicate or fraudulent tickets, and compels the prompt reporting of all tickets sold by agents or others; and as such is indispensable to every company.

By making free use of the information gleaned by the traveling auditors, and with the aid of many curious and subtle devices, impossible to enumerate here, but at once effective and economical, and which will readily suggest themselves to accounting officers, this department throws around the issue, sale and accounting of tickets certain safeguards that cannot wisely be disregarded.

Economy can perhaps best be secured in the organization of this department by the employment of women and boys. The employment of such a force is not inconsistent with the highest efficiency.

Women are peculiarly well qualified to perform much of the clerical work required in each of the department offices at the headquarters of our railway companies.

A woman possessing reasonable firmness and administrative ability makes an admirable head for carrying out the purposes of the return ticket department.

For the purpose of economizing in the number of reports required from agents, the department is organized, so far as possible, to work in connection with the general ticket office. Instead of requiring separate reports, those sent to the general ticket department are used by the Ticket Auditor.

When the ticket accounts upon a railway are not kept in the same department that is charged with the custody of the passage tickets of the company, then the return ticket department should constitute a part of the office having charge of the ticket accounts.

In other words, it is only when the ticket accounts are kept by the person having charge of the company's supply of tickets and the making of rates that the return ticket office should be separated from the ticket accounts.

Some of the details to be observed in the organization of the return ticket department may be stated as follows:

The Ticket Auditor's assistants should learn, thoroughly, the names of each and every ticket office or station on the road, and the order in which it appears, and on what division, so that they will know the exact location of each office instantly, and without having to refer to the list of offices.

This knowledge is necessary to enable them to distribute the tickets with rapidity and accuracy.

They must also learn the names of all the different railroads. In assorting the tickets into the case, and again when the same are checked with reports (at all times, in fact), they will keep a vigilant watch to see that all tickets returned are duly and properly canceled by being punched.

When they are not so canceled, they will punch them.

The ticket case into which the tickets are to be distributed, upon their reaching the office, preparatory to their use in connection with the accounts, should be arranged so as to provide a compartment or pigeon hole for each class of tickets sold at each station, and sufficiently large to accommodate the tickets sold during any one week or month, as the rule for checking requires.

A compartment should also be provided for each foreign road. It should be sufficiently large to hold all tickets issued by each road, collected in any one month.

It is necessary, to make the auditing of tickets of value to the company, that the utmost care and watchfulness should be exercised in assorting, arranging and checking the tickets with the reports, being careful to see that none are lost.

It should be kept in mind that the main object in auditing the tickets, so far as the routine work of the department is concerned, is:

1st. To see that every ticket collected, or sold, or used, is duly reported.

2d. That tickets are promptly collected and returned by the conductors, and,

3d. That tickets are duly charged upon the books of the company against the person responsible for their issue.

This result is secured (in co-operation with the general ticket office) by the faithful carrying out of the rules and regulations.

A memorandum should be taken of any ticket or tickets collected not properly reported and for which proper authority is given.

The general ticket office should forward to the return ticket department, monthly, a detailed report of all sales and collections made by that office.

This report of the General Ticket Agent should be carefully examined and checked throughout by the Ticket Auditor.

All tickets, no matter by whom issued, not regularly and properly reported, or about which there is any error or doubt, should, pending investigation, be retained in the office, putting them in a small envelope, and writing on the back of said envelope a concise history of the matter, giving the dates, etc., etc.

These envelopes should be locked up in a drawer marked "unadjusted tickets."

As fast as these tickets are reported, or the question in regard to them is settled satisfactorily, they should be disposed of the same as the others.

Agents should be notified of any errors in their reports.

They should be promptly notified of any delay in getting reports from them.

Their attention should be called to any tickets collected that are not plainly and legibly stamped.

All tickets, coupons, passes, stubs of tickets, stop-over checks, and books in which tickets have been bound must be returned by conductors to the Ticket Auditor.

In sending in the tickets collected, conductors should arrange them in the following manner, viz:

First, the local tickets sold at each station should be put together.

Second, all the local tickets collected should be arranged together, facing one way and right side up; a rubber strap or string should then be fastened securely around the same, so that they will not be torn apart before reaching the office.

Third, the local coupon tickets collected should be arranged in a package by themselves, in the same order as the local tickets.

Fourth, the foreign coupon tickets should be arranged so that the tickets issued by each road will be together, and the whole fastened together with band or otherwise, as directed above for local tickets.

Fifth, all commutation, excursion and other kinds of tickets, not specified above, should be arranged separately, in the same general way as directed for the local tickets.

It being the intention to have all tickets reach the office so that they can be distributed from the envelopes directly into the ticket case and otherwise facilitate the rapid transaction of business, conductors should transmit their tickets to the office immediately upon arrival at their destination.

In the event no tickets are collected, conductors should fill out an envelope giving date, number of train, etc., and transmit that.

Conductors must always fill up the blanks provided on the envelope for date and number of train.

Every ticket collected must be punched by them with the particular pattern of punch assigned them, and tickets must be punched so as not to destroy the number or other distinguishing marks.

If conductors neglect to carry out any of the foregoing rules, or any other necessary regulation, their attention should forthwith be called to the matter.

In the event any just cause of complaint against conductors or agents is not promptly remedied by them, the Superintendent of the division should be promptly notified of the neglect and requested to remedy it.

Sometimes tickets, after having the destination inserted, are not wanted by the passenger, or a ticket is desired to some other point, necessitating that a new ticket should be filled up; in this way and in various other ways many tickets are spoiled. Across the face of such tickets, agents should write in ink "spoiled ticket," inserting the date. These tickets should be returned to the Ticket Auditor. They should be carefully examined by that officer; they should then be punched with the office punch, and a full and complete record made of them for future reference. Upon the completion of this duty the tickets should be forthwith transmitted to the General Ticket Agent.

All letters, dispatches and statements should be signed by the Ticket Auditor, and an impression of same taken in the copy book.

Local Card Tickets.—The local tickets as they are returned by the conductors are to be distributed directly into the ticket case.

At the close of each week, or as soon thereafter as the tickets have been returned by conductors (as per "record of trains" book), the report of local tickets sold at each station must be carefully examined and checked with the tickets actually collected for each station.

The tickets must be arranged in numerical order, from lowest to highest number.

This can best be accomplished by using a board containing one hundred squares, ticket size, the squares being numbered consecutively from one to one hundred.

The numbers of any tickets that are missing must be carefully entered in the blank column opposite the "number sold" on the weekly report.

The number of every missing ticket should be entered each week in the "Record Book of Missing Tickets."

When missing tickets are collected by the conductors and returned to the office, refer to record book of missing tickets, and run a colored pencil through the number of the missing ticket that has been collected, having a distinct color for each week in the month.

In entering the numbers of the uncollected tickets, a different kind of ink should be used by the Ticket Auditor for each week in the month; the initial of the month should also be inserted directly after the uncollected numbers for each week. When the uncollected tickets finally reach the Ticket Auditor the number of the ticket should be cancelled on the record book, as directed above, with a colored pencil appropriate to the particular week in which the ticket was collected; the initial letters of the month in which the ticket was received should be entered directly above the number.

In the event tickets are collected that are not reported sold, the report should be corrected.

When an unreported ticket is collected, the number of which is far in advance of the "closing number," the agent should be instructed to take the ticket bearing the lowest number that he may have on hand to that station, and renumber it the same as the unreported ticket, and put it in the place of the said unreported ticket in his case, giving the Ticket Auditor's office the original number of the ticket so altered, so that the number may be changed on the reported ticket to agree with the said original number.

When the report for the fourth week has been checked up, or as soon thereafter as practicable, the monthly ticket reports should be procured from the general ticket office, and the commencement and closing numbers on the said monthly report checked with the closing number, as shown on the reports for the fourth week in the preceding and current months respectively.

The general ticket office should again check the commencing number with the closing number for the preceding month, in addition to checking the number of tickets sold, rates, extensions and footings.

In connection with this matter it may be said that any monthly reports, no matter whether local or coupon, that may come into the hands of the Ticket Auditor, should be examined throughout by that officer whenever it is thought advisable.

After such examinations the totals should be copied and afterwards verified by reference to the Local Treasurer's books, when the accounts for the month have been audited and charged up.

Without lessening the responsibility of the General Ticket Agent, in any manner, it must rest with the discretion of the Ticket Auditor, at any and all times, to exercise such supervision over the ticket accounts as may in that officer's estimation be necessary to prove the entire correctness of any account or statement connected with the ticket business. The relation the Ticket Auditor bears to the General Ticket Agent is, in many respects, the same as that which the Auditor proper bears to the Local Treasurer.

After the various balances of agents, conductors, railroad companies, etc., have been certified to the Local Treasurer by the General Ticket Agent, the Ticket Auditor may, whenever he thinks necessary or desirable, take all the original returns and examine and balance them, and also certify to the correctness of the result made by the General Ticket Agent.

No matter what special duties the Ticket Auditor may choose to perform, it is the duty of the General Ticket Agent to see that agents' reports are correctly audited, so far as they can be from information in his possession, and nothing the Ticket Auditor may do, or may fail to do, lessens his responsibility in the premises.

As fast as the local tickets are checked with the weekly reports, a band will be put securely around the tickets sold at each station; the tickets will then be put into a paper bag, and a tag attached to the bag giving the name of division and date.

At the expiration of a certain specified time, not to be less than three months, the local tickets are to be burned in the presence of some responsible representative of the company.

Half-Fare, Excursion and Miscellaneous Forms of Local Tickets.—These tickets are to be placed in a secure place each day, as they are returned by conductors.

At the end of each month they should be distributed into the pigeon holes for each station.

For this purpose the same pigeon holes that are used for the local card tickets can be used, if necessary, but this should not be done until the local card tickets for the fourth week have been checked up with the report for that week, and before the local card tickets for the first week have been distributed into the case. The better way, however, is to have separate compartments arranged especially for these tickets.

When the "half-fare," "excursion" and "miscellaneous" have been distributed as described above, and arranged in proper order, they should be checked immediately with the number of tickets sold during the month, as shown by the monthly ticket report.

After being so checked and when the reports have been altered in red ink, if incorrect, such "half-fare" "excursion," and "miscellaneous" tickets as have been checked and examined and have been found to agree exactly with the reports, and all missing tickets duly recorded, should be turned over to the general ticket office, when they should be again examined and compared with the monthly reports. This should be done to insure perfect correctness.

The commencing and closing number on the reports for these tickets must be carefully examined, as in the case of local card tickets.

This rule also applies to "commutation" "thousand-mile," and "special local" tickets. Such tickets should be carefully checked with the reports of the agents selling the same.

Many tickets of the classes just named are never taken up; nevertheless, all tickets that are returned must be carefully traced to the report of the agent responsible for the same.

As a rule, all tickets that are issued that are good for more than one trip should have a duplicate or stub attached; this duplicate or stub should be detached by the conductor from the ticket and returned to the Ticket Auditor on the date when the ticket is first presented or used. The possession of the duplicate ticket by the Auditor enables that officer to ascertain that all tickets are promptly accounted for by the agents selling the same at the time they are sold; without the duplicate ticket the department would have no means of ascertaining the desired information in the case of yearly, half-yearly and other tickets good for more than one trip until the ticket was collected at the date of its expiration, and not then in many instances, as such tickets are frequently never collected by the conductor, but are retained by the holder. A daily report from conductors of the tickets in use of the class referred to is, as a rule, impracticable in consequence of the time that would unavoidably be consumed in taking the numbers and other particulars on the trains, the conductor in many instances having

barely time to perform the routine duties of cancelling tickets, collecting fares, etc. Such reports should be required occasionally and at irregular times from conductors, as directed in the next paragraph, but the great reliance in watching the sales must depend upon the stubs collected and returned as specified above.

Conductors should be required from time to time, at periods not far removed, to report full and minute particulars of all commutation, thousand-mile, and other special tickets retained in the possession of passengers riding upon their trains.

These reports must be carefully compared, to see that all the tickets called for have been duly reported to the company. All tickets duly reported by the agent selling the same will be turned over to the general ticket office monthly.

Local Coupons.—A compartment should be provided for each coupon ticket station, and the tickets collected each day should be distributed into the different compartments.

Reports of local coupon tickets sold (i. e., tickets sold to points on other railroads) are sent monthly by agents to the general ticket office.

As soon as these reports are received, the general ticket office should turn them over to the Ticket Auditor, so that the number of tickets the agents report having sold may be carefully checked with the coupon tickets actually taken up and returned by conductors.

As soon as these reports have been checked as described above, they should forthwith be returned to the general ticket office, with the tickets, noting on the reports, plainly in red ink, any errors the agents may have made in the number of tickets sold, destination, class, or otherwise.

For the purpose of examining the commencing numbers on these reports, the reports for the preceding month should again be procured from the general ticket office, and the closing number carefully compared with the current month's commencing numbers. This labor should also be performed by the general ticket office, besides making the other examinations necessary to secure perfect correctness in the reports before auditing the same.

Foreign Coupon Tickets.—The reports for tickets sold by foreign companies over the road will be sent to the General Ticket Agent; upon their receipt by him he will forthwith transmit the same to the Ticket Auditor. The Ticket Auditor will without delay compare the said reports with the tickets collected, sold during the month for which the report is made. Any errors discovered in the report should be noted in red ink upon the face of the same. The reports with the tickets should then be returned to the General Ticket Agent.

Weekly Reports.—After the examination of the reports is completed, they should be filed away each week with other reports and papers and carefully preserved.

Record Books.—Books affording the following information are required to be kept in this department:

1st. A record of the missing local tickets for each station, a separate book being kept for each class of tickets (using as many as may be necessary), as they have been enumerated therein.

2d. A record of all unreported tickets, with a concise history of the same.

3d. A record of all duplicated tickets received.

4th. A record of trains. For this purpose a book should be used, the pages of which have a column for each day in the month, the number of the train, as indicated by the time table, being inserted in the left-hand margin of the page. As the envelopes containing the tickets for the different trains are received from day to day, the particular place allotted for recording each train on that particular day should then be checked. All unchecked spaces would then show, at a glance, the number of trains for which no returns have been received.

It is an open question whether the ticket accounts should not be under the immediate and entire control of the Ticket Auditor.

The possession of the tickets by the General Ticket Agent and his authority to make rates, enter into agreements, etc., etc., are utterly inconsistent with the unrestricted possession of the accounts.

Any effort to secure an effective check upon him through the office of the Ticket Auditor may, upon some roads, be found to be practically impossible. The jealousy between departments; the impatience people naturally feel under any sort of restraint; the impossibility of accurately defining the duties of the different departments under the ever changing fluctuations of business, and the clashing of authority in consequence thereof, may render it impossible for the Ticket Auditor to perform the duties assigned him. In such case all the ticket accounts should be transferred to his office. Such a system has the merit of perfect practicability and undoubted efficiency in its favor; it is in many respects preferable to any that can be devised, and is more in harmony with the general system of railroad accounts. To enforce it without injury to the company it would only be necessary to provide the General Ticket Agent with adequate statements from agents and others of the number of tickets on hand, the number of tickets required, and such other information as he might need to enable him to make adequate provision for supplying the tickets required in doing the business of the road.

Expansion and Contraction—Some Remarks on Rail Joints.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Inspector" makes some inquiries in the *Gazette*, of May 25, about the proper allowance for expansion of steel rails. The following may be of some interest to those in charge of track-laying and repairs.

By a calculation made some years since it was concluded that a continuous line of rail, 500 miles long, would expand one-fourth of a mile by the heat of the sun. A recent calculation gives the amount at three feet to the mile, which exceeds the former amount by four and one-fifth inches per mile. The

latter is undoubtedly very nearly correct, although either amount would be found exact in the right latitude, for be it known that rails will expand more in some latitudes than in others. This being accepted as a fact might lead one to suppose that a greater allowance should be made in hot than in cold portions of the country; that a rail would expand more in New Orleans or the Gulf States than in Northern New York, New England or Canada. It must be remembered, however, that cold is as powerful to contract as heat is to expand, and the greater the variation in temperature the greater the space required at the joint for expansion and contraction. Rails get excessively hot at New Orleans, and probably stretch to as great length from the effect of solar heat as on any part of the continent, but they are of a mild temperature when laid, consequently less allowance will be necessary there than at Quebec, where mercury freezes every Winter; yet it often runs as high in August and September in Quebec as at New Orleans. With the exception of the extreme northern portions of the United States and the British provinces, probably three feet to the mile is a correct amount to allow in temperate weather for expansion. Assuming this to be correct, then the allowance for 28 feet rails should be $\frac{3}{8}$ of an inch, which would lack $\frac{1}{4}$ of an inch of being three feet to the mile—near enough for practical purposes; but the better way would be to take the safe side and make the shim the merest trifle thicker than $\frac{3}{8}$ of an inch or, to be very accurate, add the 189th part of $\frac{3}{8}$ of an inch to a $\frac{3}{8}$ shim and you have it. For a 30 foot rail, four twentieths or $\frac{1}{5}$ of an inch space would fill out three feet to the mile lacking $\frac{1}{4}$ of an inch. Shorter rails (not much used now) would require less. In short, divide 36 inches into the number of joints in a mile and you are right. For a 36 ft. rail $\frac{1}{4}$ of an inch space would make the three feet within half an inch, which divided into 144 parts (the number of joints in a mile) would make rather a fine thing for common track-men to bother with, but, any way, better put the fractions on the safe side, that is, on the side of more space.

But these accurate allowances are of no use without other considerations. If the rails while being laid have already expanded one-half as much as they ever will, the shim should be correspondingly reduced in thickness. And it sometimes happens that rails are laid when expansion has reached the maximum, when no allowance would seem necessary. These are nice points and should be carefully considered. Any one who feels sufficiently interested in this matter can readily ascertain by experiment how much rails have expanded when being laid, so that they may determine the proper thickness of shim to use at any time.

Get a rail of each of the different lengths in use and place them on timbers or ties so that they will lay firm and straight and fully expand to the sun. Then get some nice strips of ash or other suitable timber from the car shop and make a straight pole a few inches longer than the longest rail. If you want to be very nice about it you can put a bone or ivory head on one end of the pole and on the other end set in an ivory rule (bone or ivory will not expand) with slide and thumb screw. You should have a rule with which you can measure the smallest fraction of an inch. Now get a thermometer and you are ready to take a measure. Note the day of the month, the time of day and the temperature at the time of the measurement. Of course you will be up at sunrise, and then is a good time to measure your rail and again at 9 a. m., at noon, 3 p. m. and at sunset. Note whether it is cloudy or clear at the time, and be particular about the thousandth of an inch in the measurements. And if possible you should have a measurement on the hottest and coldest days of the year. At 45° or 50° of temperature a rail should be just the length it was intended for, that is, a 30 ft. rail should not vary the thousandth of an inch from 30 ft. at that temperature, and rails laid at that temperature will need a full allowance for expansion. With the thermometer among the nineties and hundreds in the shade, rails will get exceedingly hot in the sun at the time and may be laid very nearly tight, but be it ever so hot a slight space at the joint is advisable. Although rails are expensive and a wide space at the joints exposes the ends to severe pounding, which is destructive alike to rails and rolling stock, and no more space than is actually necessary for safety should be allowed, yet, the law of expansion is arbitrary and must be provided for, even at a sacrifice of rails. It is not advisable to leave a half-inch space when a quarter is enough, neither is it economy to be too saving of a little time and trouble in getting it just right. If considerable more space than necessary is left in excessively hot weather, the opening will be much too wide in cold weather and the rails soon show the pounding, and "there is money in it."

Contraction now comes in for a share of attention. At 40° below zero a rail gathers itself up as short as possible; in fact, so to speak, it makes a strong effort to crawl into itself, and through the medium of splice-bars and bolts tries to pull its neighbors in two. Doubtless many broken rails and fish-bars and bolts are caused by the tremendous strain imposed upon them by the effect of cold. With a tremendous strain, nearly all it will bear, and insufficient or defective tie support, the weight of a train will be likely to snap a rail or pull the splice-bars in two or break the bolts, which if screwed too tight, are subjected to a powerful longitudinal strain as well as the lateral strain from the shrinkage or contraction of the rail.

This is on the supposition that the joints were open in moderate or mild weather more than they should be and there is not sufficient "room" in the general make-up of the joints to allow of contraction without undue strain on the rail and fixtures.

To be precise in this matter—and its importance will warrant precision at considerable pains and some expense—a rail should be precisely of a given length at a given temperature. Say make 50° a standard temperature for the precise length of rail, and then in your measurement ascertain the amount of contraction or expansion as the temperature is below or above that degree. At St. Albans or Montpelier, Vt., Quebec and Montreal are favorable localities for taking mea-



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Editorial Announcements.

Pages.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

THE INSURRECTION.

It is not easy to discuss coolly the events of the past week in connection with the strikes of brakemen and firemen on various railroads. The strikes themselves, as strikes—that is the simple refusal of classes of employees to work for the reduced wages offered them—have dwindled into insignificance in comparison with the acts of violence which have accompanied the strikes. And by acts of violence we do not mean simply fighting against the authorities appointed to keep the peace, but also the obstruction of the business of the railroads, the acts by which the owners of railroads were prevented from using their property, and men volunteering to take the places of the strikers from exercising their employments. The crime of the strikers began before they threw a stone or fired a pistol; it began when they uncoupled an engine from the train, yes, and before, when they said that no train should go out. That moment they made themselves enemies to the community, not to be reasoned with or entreated, but to be arrested, tried and punished, and, if they persisted with force, to be shot on the spot like highway robbers. And this is true whether the strike, as a strike, was justifiable or not; that is, even if the reduction in wages complained of was uncalled for and unreasonable. It is important that these two things, the strike and the insurrection, be separated. A strike may be justifiable, a duty even; the seizing of an employer's property, the intimidation of the men whom he may engage in the place of strikers, not to say assaults upon them and those engaged in protecting them, are crimes which must be repressed and punished before a thought is given to redressing any grievances, however real, that the strikers may have had. This lesson should be taught now in a way that will never be forgotten, or the consequences are likely to be dire for the whole community for a long time to come. The men who have a perfect right to refuse to work themselves if the terms offered are unsatisfactory, when they obstruct the movement of the trains which they have abandoned are guilty of an act which is as unjustifiable as if the railroad companies should attempt by force to make the men work for them at the reduced wages. In

the latter case, the companies would be making slaves of their men; in the former and actual case, the men are virtually endeavoring to make slaves of their employers.

We are not prepared now to say that the reductions of wages made by the companies were warranted. And, indeed, it is hardly possible for any one to decide that question until the experiment has been tried. If the companies cannot get a sufficient number of qualified men, or men who can become qualified with a little practice, then the reduction was not warranted and the companies will have to pay higher wages, whether their business is small or large, profitable or unprofitable. But, on the other hand, if they can get plenty of effective men at the reduced wages, then the reduction was justifiable and would have been inevitable sooner or later, however poor may be the support which such wages afford. It may seem very hard to reduce the wages of a thousand employees from \$1.50 to \$1.35 a day, but what shall we say of the case of the thousand other men anxious to get the same places for a dollar a day? It is not only those who get low wages that must be considered, but those who get nothing. Fortunately, the problem of the proper rate of wages, too complex to be settled by us on first principles, in the main settles itself, though always with more or less friction and attendant suffering through lack of employment, etc., whenever it becomes necessary for large numbers of men to be transferred from one employment, in which there is a surplus of labor, to another, in which there is room for more. Perhaps in future centuries so complete a record of production and consumption will be kept that we may to some extent avoid the great overstocking of certain kinds of employments, and the consequent great and sudden fluctuations in the demand and supply for labor and products. But we can do nothing of the kind now, and must let things, in the main, settle themselves in their own way, which is often a very rough way.

Now a strike, a simple strike—the refusal of certain classes of trainmen to work for the wages offered—would have very soon shown whether the reduction in wages was practicable. Within a week or two it would have been known whether men enough to fill the places of the old trainmen could be got at the reduced wages. If they could not, as we have said, the companies would have been compelled to pay higher wages, and that without any reference to the returns made to their owners. It is common to justify the reductions of wages by the reductions in net profits of railroads, and, on the other hand, to give as a reason for opposition to a reduction of wages the continuance of high dividends, or rates of interest on the capital invested, on a few railroads. Doubtless there is a connection between the profitability of railroads and the wages of employees, but it is not a direct one. It happens that all business is now depressed, and therefore that a vast number of men are out of work. If railroad business only was depressed, and the demand for labor in other employments was active, it would not be possible to reduce the pay of railroad men materially. Otherwise, they would leave the business. The railroads might be making nothing over their working expenses and yet be compelled to pay high wages to their employees, which actually happened to more than one road in 1873 and before. On the other hand, railroad business might be very profitable, and yet, if other business were very dull, it would not be possible for railroad men to obtain a high rate of wages. Everybody would be trying to get into railroad service, and wages would be forced down. If the employees should be made to share the gains and losses of the proprietors of railroads—the stock and bondholders—a great many of them would be working for nothing to-day and would have been for years past. Properly they do not take any of the risks of capitalists, and while one consequence is that they do not share the losses of that particular body of capitalists which employs them, another is that they do not share their gains. The New York Central has continued to pay 8 per cent. dividends on its stock ever since the panic, but that is not a reason why it should pay the same wages as in 1873. The New York & Oswego Midland never earned a dollar for its stockholders, and for years has not earned a cent for its bondholders—more than that, for some time the Receiver absolutely had to borrow money to pay its working expenses; but meanwhile it has had to pay as high wages for the same kind of service as the New York Central—probably something more. This was perfectly proper; a man would be a fool to accept two dollars a day on the Midland when he could get two and a half on the Central; but the converse also is true, and no company is bound to pay more than the market rate of wages, however much money it may be making. If it does pay more, it is usually only apparently: its four-dollar-a-day men are better, more effective employees than the three-dollar-and-a-half men who occupy similar positions on the roads around it.

But, as we have said, it is hardly the time to discuss the proper rate of wages and the circumstances which determine it when men are absolutely making war against the railroad companies and the public. The first duty of the hour is to compel these men to obey the law and to pun-

ish them for their violations of it. Only last spring the New York Legislature passed a law making if a criminal offense punishable with imprisonment for not more than ten years for any person to obstruct the working of a railroad by misplacing switches, removing rails, etc.; this law should be enforced, if it should send a thousand men to the penitentiary. And though, as we have said, it is not impossible that wages have been reduced too much, and cannot be kept down, and under the operation of an ordinary strike might properly be raised (though the indications are to the contrary), this outbreak makes it important that there should be no advance now. Otherwise the universal conclusion of railroad and all other employees throughout the country will be that they secured the advance by fighting for it, and henceforth labor riots will be of common occurrence. The communistic spirit would thus be nourished, and the result doubtless would be that the country hereafter would be burdened with the support of a considerable standing army, to eat up the savings of labor and capital, and annihilate the great advantages which we have had over European countries—advantages which, on the whole, have probably been greater for the workman than for the employer. It will not do to have it appear that workmen have profited by their crimes, and through them attained their ends; it is in the highest degree important that the guilty ones suffer for their acts. The question of wages may be settled at another time. Now the future peace and welfare of the community are at stake. An available effective army on hand at the time the Baltimore & Ohio trouble began would have soon made an end of the violence there, and probably prevented any outbreak of the kind elsewhere. We have not heretofore kept such an army because there was little or no need of it to maintain domestic tranquillity. But the people of this country love order too well to submit to such violations of it as we have had for the past week; and they will insist on having it, even at the cost—the enormous cost—of a standing army, which will increase the burdens of every individual in the nation.

THE STRIKES.

At the time we write the strikes of railroad men have extended from New York to the Missouri. In several places there has been great destruction of life and property, and lawlessness has run riot. Of this condition of things there is little to be said, excepting that lawlessness must be suppressed and the transgressors punished. The strikers, or rather the rioters, seem to have some sort of indefinite idea that if they can only inflict a sufficient amount of injury on the business of railroads, or destroy enough of their property, in some way their demands will then be acceded to. Nothing could be more mistaken than this: in placing themselves in antagonism to the laws of the land, they are invoking an irresistible power, by which they are certain to be overcome. Because they have been successful in resisting a handful of undisciplined soldiers or policemen here and there, it no more follows that they will ultimately prevail than it does that death will not finally overtake us because an attack of illness has been cured by the doctor.

Up to the present time there has been no general alarm in the community, excepting perhaps in one or two places like Baltimore or Pittsburgh. Every one has felt that those whose duty it is to suppress such demonstrations were perfectly competent to do it; but if the strikes should spread so as to excite any general apprehension in the community that law, life and property were in danger, a force would spring up which it would be useless to resist, and which would sweep the rioters out of existence. Already we hear of the organization of vigilance committees and the recruiting of new regiments under command of experienced officers in the late war, and this would doubtless be done all over the country should the condition of things demand it. The sooner, therefore, the men engaged in the strikes are convinced that it is hopeless to attempt to succeed by violence, the less will they lose, the fewer lives will be sacrificed and the less property destroyed. The country is not yet ready for a reign of what is called communism. Those who by industry and economy have managed to accumulate more or less property are not yet ready to share with those who have been less thrifty, and the men who are willing to work are not about to begin to help to support the loafers who will not work. We may be assured, then, that the existing order of things will not be revolutionized by the blindness of the men who call themselves the friends of the workmen, but who are in reality their worst enemies.

The state of the case was presented very concisely by a New York judge, who is reported in one of the daily papers to have said: "Firstly, the railroads have a perfect right to pay their employees whatever they may think proper; secondly, the employees have a perfect right to strike work if they do not think they are being paid sufficiently for their labor, and, thirdly, when they resort to violence they become rioters, and as such the cities and States will have to pay whatever damage they may do."

But it may be said, or asked, is this all? is a great up-

heaven of this kind only the grinding out of inexorable fate, in which the weakest cause will be crushed, and the strongest survive? In a certain sense this is exactly what will occur. The instinct of self-preservation in society will lead to the suppression of rioters. The men who violated the laws will in this contest be seen to come out feeling, bitterly doubtless, that they have been defeated and condemned. Owing to the attitude they assumed, the only thing which is left for the community to do is to suppress them, and protect itself from such violent acts. When men come with fire-brands and muskets, arguments about social science or political economy are not in order, and the only science which will be appealed to will be that of military tactics.

The men engaged in riots and lawlessness may be assured that, before any step can be taken either for their advantage or that of their employers, peaceful means must be resorted to.

It can hardly have escaped the attention of railroad officers, however, that not only is there existing a very great feeling of sympathy with the men who have struck for higher wages among what are called the working classes, but that among others who are not easily deceived by the shallow doctrines of ignorant demagogues, there is a feeling that there is, notwithstanding that the men who have struck to resist a reduction of wages have placed themselves so hopelessly in the wrong, still something to be said for their side of the question. Precisely what rate of wages would be fair under existing circumstances it would of course be impossible for us, or any one else without special information on the subject, to say. Whether firemen should get \$1.25 per day, which was the lowest rate of pay to that class of laborers, on the New York Central in May, or \$2.24, which was the highest on the Erie at the same time, we will not try to determine. But this we will say, that if the wages of men are reduced, it is but just and right that they should have a hearing, if they wish to be heard with reference thereto, and their presentation of their case should receive fair consideration.

It is said that "there is always a soul of good in things evil." Now in this case when the present conflict has ceased, and calmness has again been restored, the "soul of good" which will probably come from it will be a more general consideration and discussion of the relations of powerful corporations to the people they employ. The present method of settling disputes between them is the old barbaric one of conflict and force. The same method was formerly employed between uncivilized tribes and nations: when any differences of opinion or conflicts of interests occurred they resorted to fire and sword to secure what each conceived to be right and just. As they became more civilized they learned that it would be very much more rational, instead of trying to inflict as much injury as possible on each other, when disputes arose, to appoint representatives to meet and discuss the matter at issue, and thus try to come to some amicable agreement. When one tribe or nation, only partly civilized, became very much stronger than another, if a weaker one sent representatives to confer with their stronger neighbors, it sometimes happened that the strong ones cut off the heads of those sent to treat with them. In modern times when disputes arise between civilized nations representatives are selected from among the wisest men of the land, who consider and discuss the whole subject and thus try to "establish justice." If they fail to agree, it has happened repeatedly that the whole case is referred to some disinterested power or persons for decision.

Now the method adopted in the present strike is the one employed by the barbarous tribes and nations in early days, and even at present by the savages in some parts of the world, in settling their disputes. It will result just as the old barbarous wars did, in the subjugation of the weaker party, and will be attended, as those wars were, with great devastation and destruction of life, property, and by a general decline in prosperity.

The present strikes, it may be pointed out, are in their method a step backward, if they are compared with those conducted under the direction of the Brotherhood of Locomotive Engineers. The men engaged in the present strikes are largely unorganized. The associations which have been named in connection with them are little known, and some of them probably are not much more than an enrollment of the names of men for a common purpose, the means to be adopted for the accomplishment of that purpose being probably very vaguely understood. The Brotherhood of Locomotive Engineers, however, is a strong and compactly organized association, the representatives of which have authority, which is more or less clearly defined, to act for the whole membership. Now we want to point out here how much the difficulties of dealing with a strike are increased when it is conducted and instigated by an unorganized body of men, or by men who have simply met together under a common, wild impulse, which always attends strikes, whether as a cause or effect it is not worth while now to consider. When that is the case, every vagabond and idle loafer can have a voice, which is quite

certain to be a very clamorous one, on the measures to be taken in carrying out what has received little or no consideration. At present there is no power to hear or be heard, no one with authority to make or accept terms, and the contest is one in which treaties are impossible, and it becomes therefore merely a question of brute force or endurance. The fact that in all the strikes in which the Brotherhood of Locomotive Engineers was engaged within the last few years there was no loss of life or destruction to property, excepting to a very small amount, indicates, we think, that the organization of workmen into unions does not necessarily increase but rather diminishes the danger of strikes, or rather the danger of riot, for the two are very distinct. The Brotherhood of Locomotive Engineers, in fact, has advanced beyond the barbaric method; but it is to be regretted that in some cases in which it attempted to settle disputes by sending representatives, the latter have been treated somewhat in the same way as strong semi-civilized nations have treated ambassadors from their weaker neighbors—they have been refused an audience or threatened with decapitation.

Before the civilized method can be employed successfully to settle disputes between either nations or men and their employees, however, it is necessary that the representatives selected by each should be wise men. Especially should they have control of that "unruly member" which does so much mischief in the world, and above all things be temperate of speech. There is room for a good deal of improvement in this respect in some of the utterances of the representatives of the Brotherhood of Locomotive Engineers, and if facts and arguments were substituted for the harsh names and wild assertions which have recently been employed, the interests of the members of that association would be much better served.

As our readers know, for years we have tried in these pages to bring about such a condition of things that when disputes arise between working men and their employers, instead of the barbaric method which is now spreading apprehension and devastation over the land, the civilized method should be used—that is, that when a dispute occurs, instead of each side trying to do as much injury to the other as possible, each should, through authorized representatives, consider, discuss and if possible agree; failing in that, submit the case with the argument for each side to disinterested arbitrators, and each party agree to abide by their decision.

After the riot and tumult of the present strike are over, it is, we believe, certain that the subject of the relation of the employees of railroads to their employers will be more fully discussed than it ever has been before. The men in the present case have adopted the savage method of righting their wrongs. But little can be done now to bring about the adoption of the civilized method, but when the incendiary fires and feelings are extinguished, when the soldiers now on duty are mustered out of service and some of the law-breakers are enduring the punishment they so richly deserve, we trust that both railroad men and railroad officers will reflect and inquire whether it would not be possible hereafter to settle disputes of this kind by a civilized method instead of resorting to the barbarous practices which should be employed only by savages. To bring this condition of things about the men must abandon altogether their violent practices, and some of the officers must divest themselves of their august demeanor, and both parties be willing to hear the other and submit to what is just and fair. To try to crush out trades unions, to make strikes impossible, or to destroy railroads, is, however, as futile and childish as it is to cry for the moon or the millennium.

Pistons which Require No Lubrication.

In describing a form of compound engines for working steam of very high pressure, Mr. Loftus Perkins, in a paper read before the Institution of Mechanical Engineers, explained that he found some difficulty in getting ordinary pistons and valves to stand the high temperatures, or, to use his own language:

"In working these high pressures (350 lbs. per square inch) with great expansion, the ordinary mode of packing the pistons was found unsatisfactory, and to overcome the difficulty the compound piston was devised. The prevalent scoring and cutting of engine cylinders was effectually remedied by the discovery of the compound metal, of which the packing rings are made which requires no lubricating material. Many cylinders fitted with pistons made of this metal have been several years at work, and have been often examined, the cylinders showing no signs of wear, the wear taking place on the rings only, which may be easily and inexpensively renewed as required, and experience has proved that with these pistons, the longer an engine is worked the more perfect does the surface of the cylinders become, and the less wear results to the packing rings. This metal for piston-packing rings is composed of 5 parts tin and 15 parts copper, and has since been used by several other makers for ordinary engines with great success. When this metal is used, no oil or grease is required to lubricate the cylinders—a great advantage, particularly when the engines are fitted with surface condensers."

Of one engine the writer says: "After being in use nearly thirteen years, the piston-packing and valve rings made of the special metal were found in excellent condition after eighteen months' working without lubrication since last examined." If it were possible to use rings made of this metal on locomotives without lubrication it would save much care, trouble and expense. The conditions on locomotives are, however, not exactly the same as on a stationary or marine engine, be-

cause the pistons of a locomotive work without steam on descending grades, and it is at such times that lubrication is most needed. The use of this metal for locomotive piston-packing rings and for slide valves might be worth a trial.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

New York & Manhattan Beach.—Completed from East New York, N. Y., southward to Coney Island, 8 miles, and from a junction with the above westward 4 miles to the part of the road completed last year. It is of 3 ft. gauge.

Toledo & Delphos.—The first track is laid from Delphos, O., northeast to Jennings, 5 miles. It is of 3-ft. gauge.

Paulding & Cecil.—Track laid from Paulding, O., north by west 5 miles.

This is a total of 21 miles of new railroad, making 731 miles completed in the United States in 1877, against 932 reported for the corresponding period in 1876, 518 in 1875, 727 in 1874, and 1,096 in 1873.

A TRAINMEN'S UNION has been spoken of as recently organized, and including the Brotherhood of Locomotive Engineers, conductors, firemen and brakemen. The story is told that Mr. P. M. Arthur, the Chief of the Brotherhood of Locomotive Engineers, has founded the new organization, intending to merge the Brotherhood into it, and then insist on an advance in wages with horse, foot and dragons, so to speak—that is, with the whole force of men employed in running trains. But Mr. Arthur has been engaged in such an undertaking, he has not only concealed it from the public generally, but from the Brotherhood itself, trustworthy members of which inform us that no such step has been taken or contemplated. Notwithstanding this it is quite possible for a combination to be made on short notice, for the purpose of striking, without any fusion; because there is already a firemen's trade union and several organizations, we believe, of brakemen, and a simultaneous movement of three or four organizations in similar employments is almost as easy to effect as one by a single organization including the same men. The Brotherhood is much the strongest of the existing organizations, and is probably a little suspicious that it would weaken and not strengthen its position by fusion with the firemen and brakemen, who would, by their superior numbers, be able to control the organization.

JUNE EARNINGS are reported in our tables for 23 railroads, with 11,980 miles of road, which is less than a sixth of the total mileage in operation in the United States, and 4.9 per cent. more than the same roads worked last year. In spite of this increase in mileage there has been a decrease in the aggregate earnings of these roads amounting to 14.8 per cent., and the decrease in earnings per mile is from \$548 to \$445, or 19 per cent. For the half-year ending with June we have reports from 25 roads, with 13,361 miles of road, or about 17½ per cent. of the total mileage of the country. The earnings of these roads have fallen off 7.4 per cent., though there is an increase of 4.6 per cent. in their mileage. The earnings per mile have fallen \$369, from \$3,197 to \$2,828, or 11½ per cent. Nine of the 25 roads show an increase in earnings per mile, but in most cases it is quite small.

The Railroad Strikes.

We give below a brief account of the extended strikes which have disturbed the whole country during the last week, endeavoring to present an accurate view of the situation on each line:

Baltimore & Ohio.—On July 18 the Governor of West Virginia, finding that the small force of militia at his command would not enable him to cope with the strikers at Martinsburg, made application to the President of the United States for assistance. After some hesitation this was granted, and a force of regular troops from Fort McHenry and the Washington Arsenal was dispatched to Martinsburg, leaving Washington about midnight. In the meantime the railroad men had been joined by some 200 striking boatmen from the Chesapeake & Ohio Canal, and had secured the arms belonging to the Martinsburg militia company. The strikers at Grafton and Keyser remained quiet, apparently waiting on the result at Martinsburg. At Wheeling only a few men left work and they made little or no demonstration.

The United States troops arrived at Martinsburg on the morning of July 19. No collision occurred between them and the strikers, though a few freight trains were dispatched under their protection. Armed guards were sent with each train, but the body of the troops remained at Martinsburg. At Grafton the men were reported to have disabled engines by removing bolts and cutting pipes, but the local authorities took a spirited stand against them, and there was little or no rioting. This was in strong contrast to the authorities at Martinsburg, who were either in sympathy with or overawed by the rioters, so that when some were arrested the local justice released them on trifling bail.

In the meantime the strike had extended west of the Ohio River, and the firemen and brakemen left work and all freight trains on the Central Ohio Division were stopped at Newark. No violent demonstrations were made, beyond stopping the trains.

On July 20 things were somewhat quieter at Martinsburg, owing to the presence of the Federal troops there. At Keyser and Cumberland, however, the aspect of affairs was very threatening, a large number of men being assembled there. The Governor of Maryland ordered the Sixth Regiment from Baltimore to Cumberland, but on its way to the depot it was attacked by a crowd of railroad men and sympathizers and a fight ensued in which several men were killed and wounded. In view of the disturbed state of affairs in the city the Governor resolved to keep the troops there and they were not sent to Cumberland.

On the Central Ohio Division the strikers continued to stop all freight trains at Newark, but the State authorities resolved to mass the militia there and suppress all riotous proceedings, and preparations were made accordingly.

On July 21, the situation at Martinsburg was comparatively quiet, the central point of the strike being transferred to Cumberland. The strikers, reinforced by roughs of all descriptions, made a determined attack on Camden Station and the Mount Clare shops in Baltimore, but were repulsed by the city police and the Fifth Maryland regiment, who behaved exceedingly well. Much damage was done, however, in breaking windows, injuring cars and destroying some small outlying buildings. The

local authorities, however, had manifested their intention and ability to preserve order and the city quieted down very much. At Cumberland and Grafton the strike continued unabated, passenger as well as freight trains being stopped, and Gov. Carroll, of Maryland, like the Governor of West Virginia, appealed to the Federal Government for assistance. A train of oil cars was set on fire near the Relay, some miles from Baltimore, and destroyed, but further destruction was prevented.

No further effort, apparently, has been made to resume freight traffic on the road. Freight trains are stopped at all the division stations, and great numbers of men are gathered at those points, but no later violence or destruction of property is reported. Passenger trains are running on the Washington Branch, and a few run, though somewhat irregularly, on the Main Stem, and outside of Baltimore no great damage has been inflicted upon the property of the company. At Newark, O., miners were for a time very threatening, a number of coal miners and others coming to join the railroad men, but the crisis seems to have passed without a collision.

Pennsylvania.—At noon on July 19 a strike was begun on this road at Pittsburgh, the freight crews on the Pittsburgh Division refusing to go out with their trains. This strike was not directly on account of the reduction of pay, the cause given being a recent order under which east-bound freights are doubled up on the Pittsburgh division, two engines being attached to the train, which is then run with only one conductor and one gang of brakemen. It is said also that they were required to run through from Pittsburgh to Altoona with the train, instead of stopping at Derry as heretofore. The men were not satisfied with leaving work, but gathered in large numbers at the East Liberty stock yards, just outside of Pittsburgh, where they compelled all freight trains to stop. No attempt was made to stop or detain any of the passenger trains.

The strike continued without marked change on July 20. The Governor of Pennsylvania, being appealed to by the local authorities, issued a proclamation to the rioters and called out a regiment of militia to enforce order. The freight blockade continued through the day and a very large number of cars were gathered at the East Liberty yards.

On July 21, however, the strike culminated in a violent and riotous outbreak, the actors in which, however, were chiefly people not connected with the road. On the afternoon of that day a detachment of militia from Philadelphia arrived at Pittsburgh and were ordered by their commander to clear the crossing near the round-house. In doing so, they were violently resisted and finally fired upon the mob collected there, which consisted largely of laborers and others from the city, killing and wounding a number. A fierce attack was made on the troops, who were deserted by the Pittsburgh militia sent to support them, and were finally driven into the round-house, while the mob proceeded to destroy the property of the company. After setting fire to the buildings and cars in the vicinity they finally succeeded in driving the troops out of the round-house by setting it on fire, the soldiers retreating into the city with some loss. The fire spread quickly, destroying finally the round-house and shops of the company, the freight depot, passenger-house and buildings connected with it and many smaller buildings, some 600 loaded and empty cars and a large number of engines, stated variously at from 80 to 125. The entire amount of property destroyed is estimated at \$4,000,000.

Order has since been restored in Pittsburgh by the aid of the State militia and a detachment of Federal troops. The strike continues, however, and has extended east as far as Philadelphia, and to the Philadelphia & Erie road. Passenger trains are run, however, but do not enter Pittsburgh, going around by the West Pennsylvania Division. The employees of the New York and Albany divisions have not struck and passenger and local freight trains are run on those divisions regularly, but the strikers at Philadelphia do not allow freight to pass through. On the Belvidere Division the freight men have struck and all coal trains are stopped.

Some violence was threatened at Harrisburg and Altoona, as well as at Philadelphia, but there has been little or no destruction of property, except at Harrisburg.

Erie.—Stimulated, probably, by the strikers on the Baltimore & Ohio and the Pennsylvania, the firemen and brakemen on the Western and Buffalo divisions of this road left work on July 20 and proceeded to stop all trains at Hornellsville, N. Y. The officers of the road at once stopped all trains on those divisions, with the object of preventing too great a gathering of strikers at one point, but a number succeeded in making their way to Hornellsville notwithstanding this precaution. Through trains were sent by the Rochester Division, to which the strike had not extended, passengers being transferred to the New York Central at Rochester.

The strike gradually spread to the Susquehanna and Rochester divisions and all freight movement was stopped. Nearly all the passenger trains were also stopped at Hornellsville, though one or two were at last taken through. Much damage was done to property by tearing up tracks and ditching freight cars to prevent the passage of trains. The Governor of New York ordered several regiments of militia to Hornellsville and they succeeded in reaching the place in spite of obstructed tracks, but have as yet done nothing except to guard the property of the company and prevent any violent outbreak. The strike has not yet reached the Eastern Division, and trains run regularly between New York & Port Jervis, though there is, of course, no movement of through freight. Hornellsville remains the central point of the strike, though numbers of employees are gathered at Elmira, Corning, Buffalo and other points. One or two of the leaders of the strike have been arrested at Hornellsville and are held there.

New York Central & Hudson River.—The men on this road held out against the strike longest of any of the trunk lines, but strikes took place at Buffalo, East Syracuse and Albany on July 24. At West Albany the shop employees left work, chiefly through compulsion of the strikers, and the shops were closed. A very similar state of things is reported at East Syracuse, where the shops were also closed. At Buffalo, where the strike first started, the men were chiefly influenced by the Lake Shore strikers. Passenger trains have not been stopped at Albany, but no freight is allowed to pass, even a local mixed train being stopped and the freight cars detached. The latest reports from this road are not encouraging, as the strike appears to be extending. The Governor of New York has concentrated a considerable militia force at Albany to prevent violence.

Philadelphia & Reading.—A number of the employees of this road left work on July 23, the accounts stating that firemen and brakemen were the first strikers, though some other employees followed them. In the afternoon the strikers were joined by a number of men from the neighborhood and commenced stopping all trains but the mail trains, while some of them began to tear up the track. An attempt was made to clear the road by force, which resulted in a collision between the rioters and the militia, in which several men were killed and a number wounded. The militia were afterwards withdrawn from the road. Subsequently the bridge of the Lebanon Valley Branch over the Schuylkill River was burned and some other property destroyed. The road is still closed, although no further rioting is reported, and a detachment of United States troops has been sent to Reading. Latest accounts state that passenger trains are running.

Cleveland, Columbus, Cincinnati & Indianapolis.—No strike has actually taken place on this road, the order for the 10 per cent. reduction having been rescinded. The movement of through freight, however, has been prevented by the strikers

on others roads and trains have been stopped by the mobs at Indianapolis and Cincinnati, although the employees of the road remain at work.

Grand Trunk.—A strike was threatened on this road, but a conference was arranged between General Manager Hickson and committees of the employees, who agreed upon a compromise including a slight reduction of pay. It is announced that there will be no strike on the road.

Delaware, Lackawanna & Western.—The firemen and freight brakemen on the main line struck on July 24 and were followed on the same evening by those on the Morris & Essex Division. The other employees generally remained at their posts and succeeded in running a few trains, though with some trouble and difficulty. No attempt was made to injure property, but in a few cases firemen who had not left work were driven from their engines and some threats of violence were made against employees who took the place of the firemen temporarily. At Scranton it was expected that the coal miners employed by the company would also strike, and in that case a riot was feared, as the number of miners is very large and they are believed to feel very bitterly against the company.

Louisville, Cincinnati & Lexington.—Receiver McLeod last week issued an order for a reduction of 10 per cent. in wages, to take place Aug. 1. This order produced much excitement, but finally it was resolved to appoint a committee to represent the case to the Chancellor. The committee accordingly waited on the Chancellor, and after hearing them he directed that the order be rescinded.

Indianapolis & St. Louis.—The firemen and brakemen on this road struck July 23, following the example of the other roads terminating at East St. Louis, and stopped all freight trains, but did not injure any property of the company. It was subsequently reported that the shop employees at Mattoon had struck, but this statement is not confirmed.

Terre Haute & Indianapolis.—The firemen and brakemen on this road struck July 23 at East St. Louis, the movement extending along the line during the day. All trains were stopped, only the mail cars being allowed to run through, but no further violence was used. As with many other roads, the telegraphic accounts do not clearly indicate how far the other employees have joined in the strike, but it would seem that most of them do not oppose any active opposition to the strikers.

Ohio & Mississippi.—Strikes on this road took place at Vincennes, Ind., July 22, and at East St. Louis and Cincinnati on the following day. As with most of the other Western roads, passenger trains generally have been allowed to run, only freight trains being stopped. The reports from this road are not very full and it is not possible to say whether the employees other than brakemen and firemen are engaged in the strike or not.

St. Louis & Southeastern.—The brakemen and some of the other employees struck at East St. Louis on July 23, and stopped all freight trains at that point. There was but little disturbance beyond the stopping of trains, and no information has been received as to whether the strike has extended over the whole line.

Missouri, Kansas & Texas.—The trainmen on this road struck July 24 and stopped all freight trains at Sedalia, Mo. The strike in this case is not only for a restoration of former rates of pay, but includes also a demand for arrears of pay due. Passenger trains have not stopped running.

Calumet & St. Louis.—The firemen and brakemen of this road struck at the same time with the other St. Louis roads and forcibly resisted an attempt to send out a freight train, but did not otherwise injure property.

Texas & Pacific.—The strike has reached this road, Texas dispatches of July 25 stating that the men at Marshall had left their work, demanding a restoration of the recent 10 per cent. reduction and also the payment of the three months' back pay due them. All trains were stopped at Marshall.

Indianapolis, Bloomington & Western.—The firemen and brakemen on this road joined in the general strike when it reached Indianapolis, and all traffic over the road is stopped. The road being in the hands of a United States Court, it was proposed that the United States Marshal should reopen it to business, and some preparations have been made, but at latest dates no train had yet been started, though the Marshal had telegraphed to ask the assistance of troops.

Union Pacific.—This company had ordered a reduction of 10 per cent. in wages, but, like the Central Pacific, it has rescinded this order, and announced that the wages will remain unchanged.

Central Pacific.—A reduction of 10 per cent. on this road was recently ordered, but upon the breaking out of the general strike on the Eastern lines the order was rescinded, and it is announced that the company will continue to pay the old rates, making its payments, however, in silver.

St. Louis, Kansas City & Northern.—The trainmen of this road are included in the strike at Kansas City, although they are reported still at work on the St. Louis end of the line, and at intermediate points.

St. Louis, Alton & Terre Haute.—The trainmen on the Belleville Line worked by this company struck with those of the other roads at East St. Louis, but no further movement is reported.

Wabash.—A strike on this road at East St. Louis was reported on July 23. Latest advices state that the firemen and brakemen on the Eastern Division had met at Fort Wayne and announced their intention of striking on July 26, if the former rate of wages was not restored.

Pittsburgh, Fort Wayne & Chicago.—This road appears to be completely in the hands of the striking brakemen and firemen, who have possession of the principal points on the line and hold all freight trains, but allow passenger trains to run. The strikers appear to be particularly active at Chicago and Fort Wayne.

Pittsburgh, Cincinnati & St. Louis.—This road, like the Fort Wayne, appears to be in possession of the strikers, who have stopped all freight traffic. The road suffered from the riots at Pittsburgh, one of its round-houses there being destroyed, with some engines and a number of cars. Violence was also feared at Columbus, where there was almost a riot, many outsiders joining the railroad strikers, but latest reports indicate a quieter feeling.

Allegheny Valley.—The employees of this road also have struck, but there has been no marked incident of the strike, except the destruction of some cars in the Pittsburgh riot.

Central, of New Jersey.—The freight brakemen on the Lehigh & Susquehanna Division struck on July 24, and were followed on the next day by those on the Central Division. At latest accounts passenger trains were running regularly and no further difficulty was expected.

Lehigh Valley.—The freight brakemen and firemen of this road have struck, but we are without any particulars of the movement.

Lake Shore & Michigan Southern.—The strike on this road began on July 22, when the firemen and brakemen left their trains and gathered at the Collinwood yards near Cleveland, where they stopped all freight trains, unloading stock cars and turning out the stock. The strike spread rapidly eastward to Buffalo, all trains being stopped, although the men disclaimed all intention of stopping mail trains. West of Cleveland the passenger trains are running, though there are no freight

trains, and the road suffered from the disturbances in Chicago, like all the others entering that city.

Chicago & Alton.—Trains on this road have been stopped at East St. Louis and Chicago by the disturbances there, but no general strike is reported.

Chicago, Burlington & Quincy.—This road is included in the general strike at Chicago, but there are no definite accounts outside of that point.

Chicago, Rock Island & Pacific.—A strike of the freightmen on this road is reported. The trains are stopped at Chicago, but it is uncertain how far the strike has extended along the line. Telegraphic reports from beyond Chicago are indefinite, but do not so far indicate a general strike.

Canada Southern.—The strike on this road seems to include all the brakemen and firemen and possibly some other employees. Freight business is stopped, though some passenger trains are running. An attempt at a conference with the strikers failed.

Great Western, of Canada.—No strike has taken place on this road. A conference between the General Manager and committees of the employees resulted in an agreement for a reduction in wages varying from 2½ to 5 per cent., to last for three months only.

Louisville & Nashville.—An order for a reduction in wages on this road was rescinded by the managers. No strike took place, but the offices and depot of the company in Louisville were damaged by a mob, of which, however, railroad men are said to have formed no part.

Illinois Midland.—A strike took place on this road July 25, all the employees joining in it and demanding their back pay, several months' wages being due them.

Cincinnati, Hamilton & Dayton.—An order for a reduction in wages was withdrawn but did not save the road from a stoppage of trains, a mob in Cincinnati preventing the trains of the road from leaving that city.

Missouri Pacific.—Partial strikes on this road at St. Louis and Kansas City are reported, that at St. Louis resulting chiefly from compulsion by strikers from other roads. Latest reports indicate also trouble at Sedalia, where the Missouri, Kansas & Texas men have struck.

Northern Central.—On this road and the Baltimore & Potomac a strike was threatened unless the reduction in wages was recalled, but none had taken place at latest accounts.

How to Run a Locomotive—Inspection—Starting the Fire—Oiling—Starting.

(From a series of papers by Michael Reynolds, London & Brighton Railway, published in *The Engineer*, London, England.)

A locomotive foot-plate is the only place in which practical illustrations can be obtained of every way in which it is possible for an engine and an engineman to go wrong. During the time an engine is under steam with a train, everything seen, heard, felt and smelt in connection with it is capable of conveying information to the driver—of teaching him that the secret of successful locomotive driving is close observation, and that no man can on any other terms handle the regulator with confidence. On the foot-plate the eye is taught or trained to distinguish colors at a distance; the ear learns to detect the slightest variation in the beats of the exhaust. Cognizant of a daily deterioration of a piston ring, it learns also to distinguish the difference between a valve and a piston "blow," an axle-box knock from a knock in the journal. The human frame learns to decide what oscillations and pitchings are due to a defective spring, and what are due to a defective permanent way; the nose becomes, from experience acquired under all kinds of circumstances, very sensitive, so that it can detect the rising of fire, either in the lagging of the boiler from a spark, or in the axle-box from friction, even before any mischief worth mentioning is accomplished. It is under steam and speed combined that the "coral reefs" and "sand banks" on railways can be seen and marked upon the driver's chart. There are upon all lines trap points, trap sidings, and gulleys put in for the safety of the public, which, if an engine driver is not thoroughly acquainted with them, are as surely capable of wrecking an engine as is a hidden rock a stately ship. The rank and value of every locomotive engineer is exactly in proportion to the labor and study he has bestowed on the matter. Has he the hidden rocks upon his chart? That is the question. Because chance never built a vessel or a locomotive; and it is equally true chance never steered the one across the deep nor drove the other from London to Brighton. Of all places in the world, chance has no place upon railways. Locomotive driving, when of first-class quality, is good to-day, to-morrow, the next day, and all the year round—that is, it is constantly good; and wherever it is to be found it is dependent upon certain rules and principles, which are the foundation of success. The driver who strictly observes them wins—keeps time with the least fuel. He who does not may probably keep time, but it will be at the expense of the coal heap. Without these rules and principles all is uncertain; the hand trembles upon the regulator; the driver's eye watches with painful anxiety the needle of the pressure gauge, and he is often stricken with temporary color blindness through examining a defective fire. Nothing of this kind occurs where a very act is based upon rules and principles that have proved themselves correct a thousand times over. What are the properties of good rules and principles as applied to successful locomotive driving, and how shall they be recognized? Their properties are, they relieve the mind of the driver from painful anxiety, and under all circumstances give the same results. They are not right to-day and wrong the next; not right with "Welsh" and wrong with "Shipley"; not right with one engine and all astray with another; not right with ten coaches and wrong with twenty; not right at the commencement of the trip and wanting near the finish. In a word, when recognized and acted upon, they enable an engineman to keep time, to travel with perfect ease, and to finish with success.

Beyond doubt it is a good rule to examine an engine over a pit before going out of the shed, and the proper performance of this duty is distinctive of the highest development of engine driving skill. But to examine an engine is one thing, and to examine it under the guidance of a safe principle another. There are but few enginemen who venture out of the shed without inspecting their engine all round; but there are numbers who after doing so fall with the train, from causes too numerous to describe, but a subsequent examination proves that the looking round was useless.

Now let us see how an engine should be examined. The engine when examined properly, and to perfection, is fixed with both big ends* down, and so that each part can be tested or inspected without having to move the engine once; the examination is commenced at one specified place, and conducted systematically all round and underneath the engine, until the examiner is again at the point where he commenced. When this is being done it is a good rule to remember where others have come to grief, and what failed. The fame of an engineman depends upon how closely he inspects his engine before joining the train, and his case is no exception to the proverb which says, "Whatsoever a man soweth that shall he also reap." If a man chooses to examine loosely or by halves, or anyhow, the penalty of such sowing is much tear and wear, much breakdown, and many fines.

It is astonishing what little things have done in the way of upsetting the ordinary working of a large traffic, not to mention the inconvenience suffered by the passengers. More engines

*Probably the big end of the connecting rod is meant.—Ed.

have failed because of split pins and cotters than anything else in the motion. It is, therefore, requisite to act with caution where most have failed, and to examine all things on the principle that what is liable to fail is worth being overhauled thoroughly. The examination over the pit is only the part of a good beginning; many an engine has been examined well, and then broke down soon after joining the train, through a pump not working, etc. The engine while in motion between the pit and the train is, by first-class enginemen, put through certain performances, calculated to detect in time any deficiency in its action, for it is better to find it in the shed than to find it out when running the train. When the engine has been, between the trips, undergoing some slight running shed repairs, particular inspection is necessary; because fitters are fallible, like other men, and their work requires testing before it can be relied upon. They have inadvertently left a pump ram down, and returned the piston to the cylinder without a ring, left calipers in the feed pipes, and clacks out of the pump barrel before now. Chapters could be written to prove that many things have been found out by testing the engine off the pit, as well as by proving it over a pit, which, had they escaped attention, must have led to a vexatious failure when on the train.

The old saying, "That a good beginning insures a good finish," is indeed particularly applicable to preparing a locomotive for its trip, but doubly so as regards the state of the fire when the guard gives the "right away" signal. If the fire is not well burnt through at the start, however good or clever the driver may be, the defect will extend, like the rings from a pebble thrown into the centre of a pond, until its influence touches all things bordering on its foot-plate life. In many instances the difference between the first half-dozen of good coal premium men is a matter of pence; a shovelful needlessly used every day is sufficient to make a mark on the consumption list unfavorable to the driver, and in this respect a great deal depends upon the fireman. It is most essential on express work that the best firemen in the running shed be booked to stand side by side with the best drivers. In every shed in England, in some conspicuous place, a notice board should be nailed up proclaiming that every man, big and little, will be promoted according to merit. On long trips, from 50 to 100 miles, and where the working pressure is 140 lbs. per square inch, the fireman before making up the fire should see there is not less than 90 lbs. of steam in the boiler, and before the fire is made up—which should be with Welsh coal one and a half to two hours before going out with the train—he should get some old fire bricks and break them up small and scatter them about the grate bars, and should the latter be cut short a few broken firebricks placed either front or back will prevent the fire falling out and the cold air setting in. When Welsh coal is used it is generally, when making up the fire, put on with the hand and not the shovel, and the damper is kept open to allow the air or oxygen to combine freely with the fuel; after the fire is made the damper and the fire door are shut close. The best coals on the tender make a good foundation, and Welsh coals cannot very well be put on in lumps too large. When the fire-box is deep the lumps are placed all round the box, with the centre open for the coal to fill up when expanded by heat. Good Welsh coal swells very much, if it is allowed time to warm through before the blast is allowed to act upon it, which should be one and a half to two hours, and assumes an appearance calculated to remind an observer of a cauliflower plant. Hard coals, such as Shipley, Langley Mills, or Booth, require to be broken up into small lumps—about the size of a brick—and well watered; these, with the shovel, can be, like the Welsh, put on one and a half hours before train time, provided the damper fits well. Some first-class enginemen find that they make more coal premium by treating hard coals in this way than by commencing to fire as soon as the train starts. Hard coal fires, after standing in bank engines for several hours with the dampers and fire-doors shut, have been drawn having the appearance and hardness of coke. Hard coals make a deal of smoke, which is a nuisance, and when the dampers are not airtight it is advisable to go to the train with a few inches of clear fire, and commence firing directly the engine is moving away with the train. It is, however, the practice of some firemen to come late on duty, and therefore always start with a "green" fire, or what is generally termed a "blown-up fire," which is in reality the worst of fires. On the other hand, some firemen allow themselves abundance of time to get their engines ready, and the result is they are never short of steam; they act on the principle, which has already been referred to, that "what is worth doing is worth doing well."

The oiling, by careful and valued drivers, is finished just before joining the train. This, of course, only applies to syphons fitted with rail trimmings; big ends, eccentrics, and outside rods, fitted with plug trimmings, are filled up over the pit before leaving the shed, and the gentle canter to the train is sufficient to throw a small quantity of oil over into the worsted and prepare it for immediate action when called upon; but it is a wicked waste to fill up everything for the oil to run off the motion on the ballast. There is not that frugality in oil on some lines one would wish to see. On the motion and boiler bottom of some drivers' engines there is sufficient oil to carry the engine for miles; and when we take into consideration that four drops of oil will lubricate a big end one mile, the waste appears enormous. The best remedy is to offer a five-pound note every year to the man who can do the most work with the least quantity of oil without getting his engine hot. The oiling should always be done systematically like the examination, and then there is the least danger of neglecting anything. The following are a few explanations to causes of heating: The worsted may be too tight in the syphon pipe. It may be too far from the oil. The oil may contain glutinous matter—resin or india-rubber dissolved in it. The cotton may be too slack, syphoning all the oil away before the supply can be renewed. The cotton may be choked with tallow, which blocks up the tubes of the cotton, and this latter cause is often more the source of the mischief than anything else, and would not occur for obvious reasons if each driver was properly acquainted with capillary attraction.

The history of locomotive failures is instructive, for two-thirds of them occur through preventable causes, which should have been detected and set right before the engine left the shed pit or hooked on to the train. Superior drivers upon all lines follow no false phantom respecting luck, but habitually examine their engines—systematically and thoroughly. As this principle is observed or neglected by the engineman, so he either comes to his superintendent a pleasure or a torment. In the hands of one driver an engine will run its daily trips, and give the highest satisfaction to its builder; in those of another it is constantly in trouble, not getting off the road nor in a pitch in but from split pins falling out, nuts coming off their studs, and oil mysteriously running out of a syphon cup without keeping the bearing cool. Strictly speaking, to obtain a kind of sovereignty over a locomotive engine, and a clear bill against break-downs, all that is needed is to examine it well over the pit and off the pit before joining the train. But it is not enough to conduct the preparation of the engine for the train on the above principle, and then, after the engine is attached to the train to devote from it. No; everything which is wrought with certainty is accomplished by a common cause, and a philosopher has written, "A frequent similar effect argueth a constant cause." What, then, is the constant cause of successful locomotive driving, in so far as that it applies to the engine under steam attached to a train?

It is well known that some drivers have pulled out of a station and run six or more miles before finding out they had started without the train, and one touched the whistle, when he was stopping at the first station, for the guard to put his brake on,

finding he should overshoot the platform; but to the attentive "engineer" the starting away with the train is full of interest, for although he may have made a thorough inspection of his engine before joining the train, yet he is not at all satisfied until the full pressure of the steam is on the piston head, and he hears four clear sonorous beats. Has the piston been examined and a new ring put in? Is it at the start he listens for improved effects. Have the valves been re-set or faced up? It is at starting he leans over the hand-railing and marks the results. He has ascertained from the guard before starting that the train consists of sixteen coaches well filled. It is at the start he notes the effect on the engine, and forms an opinion whether they pull like sixteen or twenty. An express engineman, as soon as his train stopped at Brighton platform one day, said to the head guard, "Thy brak's been half-on, I'll swear." "No, it has not," said the guard. "Then thy mate's has," said the driver, who went to the rear of the train to look, and found the wheels of the van had rubbed the brake blocks from London to Brighton. Next to the importance of giving the start its proper amount of attention, in order to ascertain that the whole train is following, and the engine is in good working condition, he must conclude that the maintenance of the steam at the full boiler pressure is the only thing necessary, apart from signals, etc., to insure a successful trip.

An Australian's Opinion on American Railroads.

[Extracts from the Report of Augustus Morris, Executive Commissioner to the Philadelphia International Exhibition of 1876, to the Government of New South Wales on the Railroads of the United States, dated at Sydney, March 31, 1877.]

It may be that my anxious desire to have everything we require made in this colony, and as cheaply as it could be imported, may have imperceptibly to myself influenced my opinions. But while I am confident that the construction of American locomotives and rolling stock will enable us more readily to imitate them than the more complicated English patterns, I think I have stated sufficient reasons for concluding that the former have many points of superiority over the latter, and are better suited to colonial requirements.

The American engineers seem content with numerous ties of oak or other suitable wood, and dispense with very heavy ballasting. Nevertheless the railroads of America are remarkably smooth and easy to travel on; the greater elasticity of their lines, or the better spring to the passenger cars, being the reason.

Serious accidents from defective construction of the lines are rare, except occasionally where a bridge has turned out faulty, as that of Ashtabula. Not a single accident occurred during the conveyance of the enormous multitudes of people to and from Philadelphia during the Exhibition which could possibly be charged to bad lines or the neglect of the railroad officials.

I would say, once for all, that in recommending trials of American railway plant I am actuated solely by a desire to save the colony money, and to provide at the same time superior material to that hitherto imported. I look upon all or any of them merely as models, on which I hope soon to see all the railway and other plant, required for public or private service, made in New South Wales out of the raw materials, whether of iron or wood, which abound in such great quantities, and of such excellent qualities in so many parts of this country.

But until we can manufacture for our requirements, I imagine that the cheapest and best markets should be sought out.

As it has been learned by experience in the United States that the best and cheapest railroads are those which are well graded and properly ballasted, so also it has been found that the better the rolling stock the less is the liability to accidents; and consequently very great attention has been directed of late to the equipment of their railways by American engineers. The manufacturers have produced a locomotive engine which, for simplicity of structure, for power and economy in working, as well as for cheapness, compares most favorably with those of England or Belgium.

I was unceasing in my inquiries on this subject. I consulted those eminent engineers who were sent by the Russian, the German, the Austrian and other European governments, to report on American railroad plant, and my conclusions are these.

They gave the preference to the best American locomotives over the English, for the requisite qualities; and I am enabled to say that a fair number of these locomotives, provided with copper furnaces and tubes, instead of the more commonly used steel ones, can be laid down in Sydney for £2,000 each, or £1,000 less than for those contracted for in England. The boilers of the best engines are now caulked on the concave method known as "Conner's," which really increases their strength 25 per cent., and I would recommend that concave caulking should be insisted upon in all government work where caulking is required.

Perhaps over the more perfectly-ballasted lines of this colony, the relative merits of American engines may not be so apparent, unless the comparison between the Fairlie and Baldwin locomotives on the admirably-constructed English railroad from Vera Cruz to the City of Mexico may be considered sufficiently demonstrative.

The subjoined schedule was furnished by the officials of the Mexican Railroad Company, and I think, fairly shows the superiority of the Baldwin engines, which, however, are now somewhat improved:

Comparative Statement of Running and Repair Expenses of Baldwin and Fairlie Engines on the Mountain Divisions of the Mexican Railway, Vera Cruz to Boca del Monte, in 1874.

No.	Class of engine.	Time running in months.	Miles run.	At the rate of miles per year.	Wood burnt in cords.	Coal burnt per mile in lbs.	Total running and repair expenses per mile in cents.
13	Baldwin American	12 4-5	31,142	29,195	1,142 1/2	31-10	37.40
38	" "	12 4-5	30,028	28,151	1,121 1/2	31-10	37.93
26	Yorkshire Fairlie English	13 4-5	19,083	16,594	1,363 1/2	13 1/2	70.81
29	" "	13-30	12,686	11,683	978 1/2	11 1/2	83.82
30	" "	11 1-3	15,921	16,872	949 1/2	7 9-10	67.16
31	" "	9 4-5	15,510	18,992	930 1/2	6 8-10	66.42
32	Bristol "	4	4,347	13,041	378 1/2	38 9-10	91.51
33	" "	4	3,014	9,042	276	34 4-10	95.21

Baldwin engines average 28.673 miles per annum.

Fairlie " " 14.371 " "

Baldwin engines running and repair expenses average per mile 37.66.

Fairlie " " " " 79.32.

NOTE.—The cost of running and repair expenses includes wages of mechanics, drivers, firemen, etc., etc., also materials.

One of the partners in these works is an English engineer, who had the management of the Pennsylvania Railroad for many years, and who ought to know, as he professes to do, the comparative merits of the English and American locomotives; and I do not think he is so imprudent as to send to this colony one of his firm's engines on the understanding that it is not to be paid for unless it is in all respects, after trial, equal to the English locomotives in use here, without feeling well assured

that his locomotive will stand every necessary test. I furnished the Baldwin Company, as well as others, with Mr. Rae's admirable and exhaustive "Report on the Railroads of New South Wales," from which the nature of the gradients on all our lines could be learned, so that the difficulties to be encountered are known to them.

I have been thus particular in giving what I had time to learn in respect to American locomotives, because I feel that I am in some measure responsible for the advice I have given to try one on our railroads. And I am glad to be able to say, in consequence of Mr. Higginbotham's report, the Victorian Government ordered two of "Rogers" American locomotives, which ought to arrive in Melbourne during the month of May.

It is a question of taste whether the English or American arrangements of the passenger cars are more comfortable, but I think where the traffic is heavy the latter are more convenient. For suburban passenger traffic and for excursions the American cars, I should say, are altogether more suitable.

There is one enormous advantage they have over English carriages, which is the system of always having closets in the carriages, and I must take leave to differ with Mr. Higginbotham when he implies their offensiveness is greater than their convenience.

I never heard a complaint in regard to them, and cause for any could be readily remedied. In each of the three cars ordered for this colony—first-class passenger, second-class passenger and sleeping-cars—care has been taken to have both a ladies' and gentlemen's toilet room, and also a cistern to hold drinking water accessible to all the passengers.

There is no question but the American passenger cars, with their Miller platforms, are safer in case of collision than the English, which are always "telescoped" when such an accident happens, and consequently accompanied with greater loss of life, or with more serious injuries to those who escape alive, than would otherwise occur.

The usual diameter of the passenger car wheels is 33 in., and they are made of cast iron, but I think Mr. Higginbotham is mistaken when he says that "there are difficulties in making them larger." I am under the impression that there is no difficulty in casting wheels even as large as 40 in., for I saw many such at the exhibition in Philadelphia.

The objection that cast-iron wheels are "never either perfectly balanced or truly cylindrical" has been met by planing either before or after the wheel has been used.

Whatever doubt may prevail as to the propriety of adopting the American passenger cars on our railroads, I imagine there is none existing in regard to the merits of the American freight wagons.

Mr. Higginbotham says that the ordinary box freight cars on the Central Pacific Railroad weigh 19,860 lbs. each.

This weight is that of the "combination" cars, of which I obtained and forwarded a working plan on my way to Philadelphia.

The combination car is suitable for all kinds of freight, including live stock, and will carry with safety 30,000 lbs. The ordinary freight car only weighs 16,000, and will also carry 30,000 lbs.

The trucks for these cars could be imported from the United States at a very much less cost than they have been from England.

Trucks for freight cars, made with the best wrought-iron frames, four wheels to each truck, and two trucks to each wagon, would be delivered free on board in New York for a sum not exceeding £70, royalties included, at present rates for iron.

All of these trucks would be equipped with the Millmore axle and independent wheels, and would be complete in every part, and it must be remembered that these wheels will even outlast steel ones.

I think the "railway turn-tables," such as are used in the States, and indeed in both the American continents, would be found of great use at our principal stations. They are made almost exclusively by Messrs. Wm. Sellers & Co., of Philadelphia. These turn-tables, which are cast-iron, are simple in form, very durable and easily put in place, requiring comparatively inexpensive pits, and turning with ease.

The centre-plates and the rolls are steel, making the turning easier.

I have already remarked that the easier motion on the American railways may arise from the better springs used on the cars. I have myself tested one spring known as the "Godley," which is especially applicable to freight wagons and to buffers, on account of its strength, elasticity and cheapness. It is a spiral spring, but differently constructed from any other. It will bear, according to its size, weights from 10 to 15 tons, and retain in full force its elasticity. They can be purchased for 2s. per inch in height.

Some improvements of other springs being made every day in America; and when it is remembered that there are in the States and Canada more than 80,000 miles of railroad, it is not surprising that the engineers, many of whom are English, on so many miles, should be in some things in advance of their rival English brethren, who have only 17,000 miles of railroad to design for.

As is well known, the "check" system for passengers' luggage is a special feature of American railway management.

A metal disc, with a number on it, is fastened to every piece of luggage, and a duplicate of it is given to the owner. This enables the passenger to obtain his property without delay; or by giving the check to an authorized carrier, it is delivered at his hotel or private residence for a small regulated charge.

Former Strikes on the Baltimore & Ohio.

The Baltimore Gazette gives the following reminiscences of some strikes on the Baltimore & Ohio:

The present riot on the Baltimore & Ohio recalls other scenes of a similar character on this road. The first difficulty occurred on the 29th and 30th of June, 1831. A contractor on the Third Division, about 25 miles from Baltimore, absconded, leaving his laborers unpaid. The laborers took the law into their own hands and commenced to destroy the rails, sills and whatever else they could. The sheriff of the county and posse were resisted by these men, who numbered between 200 and 300 laborers. The military from Baltimore were called out, and on the morning of the 31st they arrested a number of the rioters, the others making their escape. About 60 in all were arrested, but nearly all were discharged by Judge Hanson on the next day.

On Nov. 18, 1834, Mr. Gorman, one of the contractors on the Washington Branch, about 18 miles from the city, was assassinated in his own shanty, and with John Watson, a superintendent, was dragged out and beaten. About midnight on the 19th they surrounded the office where Mr. Watson was lying suffering from his wounds, and after breaking open the door deliberately murdered him in a most barbarous manner. William Messer, one of his assistants, was dragged out of the office and shot dead, and another of the superintendents, Mr. Callan, was killed. Several others were injured. After the murders the premises were robbed. On the 25th a detachment of the first brigade of this city arrested nearly 300 laborers, who were brought to this city and placed in jail.

The strike of greatest proportions occurred on the road in 1857. On April 25, the conductors and others having charge of the burthen trains over the first and second divisions of the road, stopped work and refused to do duty. The men endeavored by force to secure their purposes. During the week the woods from Baltimore to the Relay House were interspersed with bonfires, around which they sat in anticipation of the ap-

proach of the freight trains, but none were sent out without an accompaniment of an armed guard. The crisis took place about 4 o'clock on the afternoon of the 1st of May. At that hour Sheriff Pole, of Baltimore County, with a posse of officers, appeared at the Camden station and were placed in an old passenger car, which, being attached to one of the tonnage trains, was started for the main stem near Gwynn's Falls. Here several trains from Mount Clare depot were drawn up and proceeded along immediately after the pioneer train. They encountered no resistance until the deep cut at Jackson's Bridge. Here a man was seen ahead of the engine waving his hat for the engineer to stop; but no heed was paid him—the train continued on, and the man who endeavored to stop it jumped from the track barely in time to save himself from being caught beneath the cow-catcher. An onslaught on the train followed. Pistols, short rifles then in vogue in this vicinity, and missiles of different kinds were discharged and hurled at the engineer and sheriff's posse, while they in turn fired some thirty muskets at the rioters, several of whom were badly wounded. Upon passing under the bridge rocks were hurled down upon the cars, crushing them in several places. The train passed on, but the three that followed were not so successful. They were surrounded by the rioters at the bridge, who jumped upon them, put down the brakes, uncoupled the cars and threw the coupling-pins away. They were not further interfered with, and returned to Mount Clare. The proceedings of Friday, May 1, were continued on Saturday and Sunday along the line of the road from the city to Ellicott's Mills. Governor Ligon had a conference with the officers of the road, and issued a proclamation "warning all persons to keep away from the neighborhood of these disturbances." At 4 o'clock Saturday afternoon, by authority of the Governor, the Baltimore City Guards, Captain Warner, and the Independent Grays, commanded by Captain Brush, were called out. They were placed, together with a number of the sheriff's posse, in passenger cars in advance of three burthen trains. To the extreme end of the train was the paymaster car and a small trunk car denominated "Sebastopol." Thus prepared the entire trains moved off together under the command of Colonel Shutt and Captain Rawlings. No difficulty was met with until reaching the deep cut at Jackson's bridge. Here, as on the previous day rocks were hurled at the cars and revolvers fired at their occupants. In passing the bridge rocks were hurled upon the cars beneath the bridge, but did no injury. Shots were fired by the military on the engines and by the sheriff's posse at their assailants, but none of the rioters were injured. After proceeding about a mile further the train, in passing through another deep cut, was again the recipient of a sharp fire. The military fired. One man, named Henry Howser, was killed and several wounded. Howser was formerly engaged as fireman on the road and lived near Mount Clare. On reaching Lee's Station the train was brought to a stand-still, from the fact of the engine and tender of an east-bound burthen and stock train having been thrown from the track by a heavy stone placed thereon. The track was cleared and the train proceeded on to Ellicott City. It left the mills at 10 o'clock, and returned as far as the country seat of Carroll Spence, Esq., about two miles from the city, where some one had spiked the track and the engine ran off, with four or five burthen cars, and several of the military on the engine were slightly hurt. The military returned to the city on foot and reached Mount Clare at 2 a. m. Sunday. No disposition was manifested to interfere with any of the trains thereafter and the difficulty was amicably settled.

Another riot occurred at Mount Clare depot on May 26, 1862. An attack was made on the building at Mount Clare depot by a large party of disorderly persons calling themselves union men, who beat and wounded seven unoffending workmen, whom they accused of being secessionists. On the 27th they renewed their attack, and wounded two other workmen. The police took no notice of these outrages.

An English Brake Trial.

The *English Mechanic* gives the following account of some experiments recently made with the Westinghouse automatic brake:

Recently the Northeastern Railway, following the example of the North British Railway, made a thorough trial of the Westinghouse automatic brake, taking the data of the experiments by means of the speed indicator. These trials were remarkable, from the fact that a high speed was reached in two trials, the indicator registering 63 and 64 miles per hour as the rate. The trains consisted of twelve coaches, and all the wheels were fitted with blocks on both sides, with the exception of the experimental van in the rear, which carries the speed indicator. The run was from Newcastle to Tweedmouth, 13 stoppages being made by the driver, who received an electric signal from the van, and two from the van, in one of which eight carriages were "slipped," to represent a break in the train, and to test the automaticity of the apparatus. The speed indicator was carefully tested during the journey, and found to be absolutely correct. The speeds, time taken to stop, and distance run, are shown in the table below, the trials being given in the order in which they were made. The rails were dry in all but the second trial, when they were described as "wet" from a passing shower:

No.	Character of stop.	Speed in miles per hour.	Time taken to stop in seconds.	Distance run in feet.	Gradient.
1	Applied by driver.	52½	16½	666	1 in 246 down.
2	"	47½	15½	600	1 in 286 "
3	"	60½	19	886	1 in 410 "
4	"	50	15	610	1 in 754 "
5	"	55½	17½	725	Level.
6	"	53½	16½	690	1 in 264 down.
7	"	60½	21½	1,080	1 in 150 "
8	"	47½	16	640	1 in 381 rising.
9	"	60½	19½	965	Level.
10	Applied by rear guard.	42½	15½	620	1 in 245 down.*
11	Applied by driver.	64	20	1,294	Level.
12	"	51½	15	660	1 in 300 up.
13	8 carriages slipped, brakes automatically applied.	47½	16	485	1 in 381 up.†
14	Applied by driver.	63	24	1,300	1 in 170 down.‡
15	"	37½	12	380	1 in 350 "

* Steam kept full on during stop.

† Steam was kept on, rear portion stopped 173 ft. in rear of front portion.

‡ In this experiment the train ran 100 ft. after the indicator was started, before the brake was applied.

As in the North British trials, the great promptness of action, which is, probably, the most valuable feature of the Westinghouse brake, was again demonstrated. Of course this promptness is not apparent on the face of the table, though its effects are shown clearly in the shortness of the distances run after applying the brakes. As will be seen, the results exceed anything previously attained. For instance, at 50 miles an hour, the Westinghouse stopped its train at Newark in 777 ft., and recently on the North British in exactly the same dis-

RAILROAD EARNINGS IN JUNE.

Name of Road.	Mileage.					Earnings.					Earnings per Mile.	
	1877.	1876.	Inc.	Dec.	Per c.	1877.	1876.	Increase.	Decrease.	Per c.	1877.	1876.
Atchison, Topeka & Santa Fe.....	711	711				\$177,562	\$187,331		\$9,769	5.2	\$250	\$263
Burlington, Cedar Rapids & Northern..	401	401				69,357	100,700		31,343	31.1	173	251
Cairo & St. Louis.....	146	146				19,983	23,986		4,003	16.7	139	164
Canada Southern.....	452	452				150,236	111,008	\$39,228		26.3	332	246
Central Pacific.....	1,634	1,315	319		24.3	1,391,000	1,646,269		255,269	15.5	851	1,250
Chicago & Alton.....	679	650	29		4.4	369,522	451,083		81,561	19.6	534	694
Chicago, Milwaukee & St. Paul.....	1,402	1,400	2		0.1	580,000	877,092		297,092	32.9	420	627
Cleveland, Mt. Vernon & Delaware.....	157	157				35,196	33,650	1,546		4.6	224	214
Denver & Rio Grande.....	269	120	149		124.2	56,843	34,626	22,217		64.2	211	289
Illinois Central, Illinois lines.....	707	707				360,234	511,283		151,049	29.3	510	723
Indianapolis, Bloomington & Western.....	344	344				85,090	129,090		44,000	34.1	247	375
International & Great Northern.....	616	459	157		32.4	73,600	64,948	8,652		12.3	143	141
Missouri, Kansas & Texas.....	786	786				258,123	233,126	24,997		10.7	328	297
Missouri Pacific.....	426	426				319,417	308,126	16,291		5.4	750	712
Philadelphia & Erie.....	288	288				250,705	261,285		10,580	4.0	871	917
St. Joseph & Western.....	227	227				26,878	35,217		8,339	23.7	118	155
St. Louis, Alton & Terre Haute—Belleville Line.....	71	71				34,867	37,282		2,415	6.5	491	525
St. Louis, Iron Mountain & Southern.....	685	685				304,300	252,643	51,657		20.0	444	369
St. Louis, Kansas City & Northern.....	530	525	5		1.0	171,856	228,730		56,874	24.0	324	435
St. Louis & San Francisco.....	328	328				97,778	106,612		8,834	8.3	298	325
St. Louis & Southeastern.....	356	356				78,818	90,184		11,366	12.6	221	253
Toledo, Peoria & Warsaw.....	237	237				80,010	135,926		55,916	41.1	338	574
Wabash.....	628	628				335,227	399,407		64,230	16.1	534	636
Totals.....	11,980	11,419	561		4.9	\$5,328,602	\$6,255,226	\$164,888	\$1,091,212	14.8	\$445	\$548
Total increase or decrease.....			561		4.9			\$164,888	\$1,091,212	14.8		

RAILROAD EARNINGS, SIX MONTHS ENDING JUNE 30.

Name of Road.	Mileage.					Earnings.					Earnings per mile.				
	1877.	1876.	In.	Dec.	Per c.	1877.	1876.	Increase.	Decrease.	P. c.	1877.	1876.	In.	Dec.	P. c.
Atchison, Topeka & Santa Fe.....	711	684	27		3.9	\$1,028,502	\$1,046,492		\$17,990	1.7	\$1,447	\$1,530		\$57	5.7
Burlington, Cedar Rapids & Northern.....	401	401				428,649	589,235		160,586	27.3	1,069	1,469		400	27.3
Cairo & St. Louis.....	146	146				123,740	124,068		328	0.3	848	850		2	0.3
Canada Southern.....	452	452				807,326	833,881		73,745	9.0	2,008	1,845	\$163		9.0
Central Pacific.....	1,634	1,315	319		24.3	7,700,000	8,428,029		81,555	23.8	1,777	1,677		400	23.8
Chicago & Alton.....	679	650	29		4.5	2,034,282	2,246,701		336,945	16.5	4,712	5,104		1,392	22.8
Chicago, Milwaukee & St. Paul.....	1,402	1,400	2		0.1	3,959,460	3,960,517		1,001,057	25.3	2,111	2,829		718	25.3
Cleveland, Mt. Vernon & Delaw.	157	157				184,185	184,200		15		1,173	1,173			
Denver & Rio Grande.....	269	120	149		124.2	302,860	197,195	105,665		53.6	1,126	1,643		517	31.5
Illinois Central, Illinois lines.....	707	707				2,179,489	2,680,166		500,677	18.7	3,043	3,791		746	18.7
Indianapolis, Bloom. & West'n.	344	344				579,600	769,531		190,971	24.7	1,685	2,237		552	24.7
International & St. Northern.....	516	459	57		12.4	658,027	866,868		91,159	16.0	1,375	1,335		40	3.2
Lake Shore & Mich. Southern.....	1,177	1,177				6,434,206	7,004,000		569,800	8.1	5,467	5,951		484	8.1
Missouri, Kansas & Texas.....	786	786				1,430,934	1,417,840	13,094		0.9	1,821	1,804		17	0.9
Missouri Pacific.....	426	426				1,807,458	1,751,909	55,549		3.2	4,243	4,113		130	3.2
Philadelphia & Erie.....	288	288				1,389,863	1,565,721		175,858	11.2	4,826	5,437		611	11.2
St. Joseph & Western.....	227	227				177,190	170,500	6,690		3.9	781	751		30	3.9
St. Louis, Alton & Terre Haute, Belleville Line.....	71	71				237,693	235,524	2,169		0.9	3,392	3,302		30	0.9
St. Louis, Iron Mt. & Southern.....	685	685				1,962,277	1,719,386	242,891		14.1	2,865	2,510		355	14.1
St. Louis, Kansas City & North'n	530	525	5		2.0	1,411,222	1,499,756		88,534	5.9	2,663	2,884		221	7.7
St. Louis & San Francisco.....	328	328				612,542	611,310	1,232		0.2	1,868	1,864		4	0.2
St. Louis & Southeastern.....	356	356				487,080	492,009	4,929		1.0	1,368	1,392		24	1.0
Toledo, Peoria & Warsaw.....	237	237				498,504	693,385		194,881	28.1	2,103	2,928		823	28.1
Wabash.....	628	628				1,985,763	2,086,118		100,355	4.8	3,162	3,322		160	4.8
Totals.....	13,361	12,768	593		4.6	37,789,471	40,815,297	\$392,174	\$3,625,000	7.4	\$2,828	\$3,197		\$369	11.5
Total increase or decrease.....			593		4.6			\$392,174	\$3,625,000	7.4					

tance; but on the Northeastern the best stop at that speed was made in 610 ft.—a result partly due, perhaps, to difference in the weight of the trains, and partly to the application of blocks on both sides of the wheel. In trial No. 10 the brake was applied from the van by Capt. Tyler, the driver being supposed to be in ignorance of the danger, and keeping full steam on. Under these conditions it will be seen that the train was pulled up from a speed of 42½ miles in 15½ seconds, and in a distance of 620 ft. on a down gradient. When the carriages were slipped at a speed of 47½, and the brakes applied automatically by the breaking of the couplings, the time occupied was 16 seconds, and the distance run 485 ft. by the rear portion, the engine and four carriages stopping 173 ft. in front, steam, of course, being kept on. At the high speed of 64 miles an hour, the train was pulled up in 20 seconds in a distance of 1,294 ft., or 432 yards—considerably less than the limit suggested by the Railway Commissioners. When we remember that a speed of 64 miles an hour means about 93 ft. in a second, the great power of the Westinghouse brake, and the great importance of promptitude in action, become apparent. A brake which occupies some seconds before it begins to check the motion of the train is a defective one, even if it should be capable, which is unlikely, of stopping the train in the same distance as the brake that acts promptly; for it is easy to conceive of circumstances in which a collision will be inevitable, and all that can be done will be to mitigate its results. The brake which, by reducing the speed at once, diminishes the force of the blow, is obviously a better appliance than one which permits the train to run with undiminished velocity for two or more seconds after its application. These trials are of far more utility than the discussion at the Society of Arts, and if the companies are still in doubt, they cannot do better than have a series of competitive trials, and run the brakes one against the other, under exactly similar conditions, which should, of course, be those which obtain in every-day work.

The Superintendents of the Lake Shore & Michigan Southern.

The *Toledo Commercial* has recently published the following letter, dated Cleveland, June 22, and signed "C. P. L.," which are the initials of Mr. C. P. Leland, the Auditor of the Lake Shore & Michigan Southern Railway, and one of the officers longest in its service:

While this road (Monroe to Hillsdale, 68 miles) was owned and operated by the State of Michigan—1840-6—J. H. Cleveland, now an active business man of Chicago, was the General Superintendent. In 1846 the State sold the road to the company organized by the Litchfields for \$500,000. This included the Palmyra & Jacksonburg Railroad, foreclosed by the State on its loan of \$200,000, and attached to the "Southern" as its Tecumseh Branch. The company appointed Thomas G. Cole, of Monroe, Superintendent, on Christmas day of 1846.

At the date the "Southern" leased the Erie & Kalamazoo (Aug. 1, 1849), Mr. Cole was still Superintendent, and Thomas W. Bradbury was Superintendent of the Erie & Kalamazoo. This dual arrangement lasted through 1849, when both retired, and Lewis W. Ashley, of Cleveland, was made General Superintendent of the entire "system" (114 miles) and located at Adrian, with strict orders from the board to be entirely impartial, as between Toledo and Monroe, in trains, tariffs, etc. It was during Ashley's administration, and after the Southern

had been operated ten years, and the Erie & Kalamazoo thirteen years, that the first printed time card was used. It is five inches long by three inches wide, dated Sept. 15, 1850, and has the time of trains and rules all on the face.

The list of general superintendents of the "Old Southern" is as follows:

1. J. H. Cleveland, 1840 to December, 1846.
2. L. W. Ashley, January, 1850, to April, 1851.
3. E. P. Williams, April, 1851, to March, 1852.
4. Joseph H. Moore, March, 1852, to May, 1854.
5. James Moore, May, 1854 to May, 1856.
6. Sam. Brown, May, 1856, to July, 1858.
7. John D. Campbell, August, 1858, to August, 1863.
8. H. H. Porter, November, 1863, to October, 1865.
9. Charles F. Hatch, October, 1865, to May, 1869.*

Of these nine, I think but three (Cole, Brown and Campbell) are dead. Joseph H. Moore has retired to a large farm near Chicago; James Moore is now General Superintendent of the Central Railroad of New Jersey; H. H. Porter is President of one and director of several Western railroad corporations, and Charles F. Hatch is building a railroad from Indianapolis to the Wabash River, and living at Rockville, Ind.

John D. Campbell died very suddenly at the Revere House, Boston, Aug. 1, 1863, exactly five years from the day he was appointed General Superintendent, and on the very day of the payment of dividend No. 1 on the guaranteed stock of the company, six years after its issue. It is a singular fact that Mr. Campbell had said over and over again that when the road reached a point where it could again pay a dividend, he would be ready to give it up. He was a man of great energy and executive power, and infused these throughout the road in every department. Yet he was kind, genial, big-hearted, and was generally respected and loved by his men.

Among the many anecdotes that the memory of "John D.," as he was generally called, brings forward, I select but one. The National Republican Convention, which nominated the lamented Lincoln the first time met at Chicago in May, 1860. The North Shore line and the South Shore line each ran a special train, bearing delegates from the East. It very soon developed into a first-class race from Rochester to Chicago. On this line the train reached Toledo all right and on time. "John D." had made every preparation, had cleared the Air Line and stationed two or three extra locomotives at different points as a reserve in case of a break-down. Then he sat in, or rather tramped around, the telegraph instrument in Toledo, asking every minute, "How is she now, Billy?" (Wm. Kline, Jr.) About 92 miles west of Toledo came the dreaded words, "Engine broke down." Campbell made one leap from the centre of the room clear through the window, then tore around through the door, making a few emphatic remarks, by way of relief, then gave the requisite orders, and very soon the train was flying again. It reached Chicago—and the delegates were at their hotels and assigned to their rooms when the delegates by the Michigan Central commenced to arrive. A few days afterward Campbell was in the office of the Tremont House, Chicago, when B. N. Rice, then General Superintendent of the Michigan Central, came in. Campbell said: "Hallo, Rice; came out second best again, didn't you?" Mr. Rice said, "Oh, we didn't make any special effort—just jogged along comfortably." "Yes," Campbell replied, "I notice by the newspapers you were laying back, killing time, when you changed engines at Michigan City without stopping your train." Audible smile all around.

* Date of consolidation with the Lake Shore Railway.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Boston & New York Air Line.—Mr. Joseph Franklin has been appointed Superintendent. He was for some time a conductor on the New York, New Haven & Hartford and has lately held a position on that road in New York.

Camden, Gloucester & Mt. Ephraim.—The new board has re-elected James B. Michellon, President; Frank B. Pfeiffer, Secretary and Treasurer.

Central Pacific.—At the annual meeting in San Francisco, July 11, the following directors were chosen: Leland Stanford, C. P. Huntington, Charles Crocker, Mark Hopkins, David D. Colton, E. H. Miller, S. F. Gage. The board elected Leland Stanford President; C. P. Huntington, First Vice-President; Charles Crocker, Second Vice-President; Mark Hopkins, Treasurer; E. H. Miller, Secretary.

Cincinnati Southern.—At a meeting of the board in Cincinnati, July 20, Mr. R. M. Shoemaker was chosen Vice-President, in place of Alfred Gaither, resigned, and W. H. Clement a director, in place of John Shillie, resigned.

Cleveland, Tuscarawas Valley & Wheeling.—The office of General Ticket Agent having been discontinued, all correspondence relating to ticket and passenger business should be addressed to P. A. Hewitt, Auditor, at Cleveland, Ohio.

Connecticut Western.—Mr. John F. Jones has been appointed General Freight Agent, vice S. A. Bennett, resigned.

Delaware Western.—The separate companies organized in Delaware and Pennsylvania by the bondholders who bought the Wilmington & Western road have been consolidated and the following directors chosen: William M. Canby, Daniel M. Bates, William Canby, W. Jones, H. S. McComb, J. L. Devou, H. C. Robinson. The board elected Wm. M. Canby President; J. C. Farra, Secretary and Treasurer.

Eastern, of New Hampshire.—At the annual meeting in Portsmouth, N. H., July 10, the following directors were chosen: Moody Currier, Dexter Richards, Walter Hastings, Francis Thompson, Edward L. Giddings. The road is leased to the Eastern, of Massachusetts.

Nashua & Plattsburgh.—This company has been organized at Nashua, N. H., by the election of the following directors: Greenleaf Clark, Nathan Gage, John W. Sleeper, George C. Goodwin, Nathaniel H. Clark, John Woodbury, Henry Parkinson, Joel C. Carey, Samuel Greeley; Clerk, William H. Hills, Treasurer, Wm. C. Noyes.

North Carolina.—The new board has re-elected Col. Thomas M. Holt, President; W. L. Thornburg, Secretary and Treasurer; D. A. Davis, E. B. Borden, members of Finance Committee on behalf of the board.

Portsmouth, Great Falls & Conway.—At the annual meeting in Portsmouth, N. H., July 10, the following directors were chosen: Alfred P. Rockwell, Samuel C. Lawrence, Robert W. Hooper, James W. Johnson, George W. Burleigh. The road is leased to the Eastern.

Raleigh & Augusta Air Line.—At the annual meeting in Raleigh, N. C., July 30, the old board was re-elected as follows: John M. Robinson, W. J. Hawkins, Walter Clark, J. B. Batchelor, W. W. Chamberlaine, Lewin Barringer. The board re-elected John M. Robinson, President; W. W. Vass, Treasurer; John C. Winder, Superintendent.

Raleigh & Gaston.—At the annual meeting in Raleigh, N. C., July 19, Mr. John M. Robinson was re-elected President, with the following directors: J. B. Batchelor, Warrenton, N. C.; Paul C. Cameron, Hillsboro, N. C.; W. W. Chamberlaine, Norfolk, Va.; Lewin Barringer, Philadelphia. The board re-elected W. W. Vass Secretary and Treasurer; John C. Winder, Superintendent; B. R. Harding, Master Mechanist. Major Vass enters upon his thirty-third year as an officer of the company.

St. Louis, Kansas City & Northern.—At a recent meeting of the board John H. Beach and W. N. Garrison were chosen directors, in place of J. H. Britton and Joseph Bogy, resigned.

Southeastern, of Canada.—At the annual meeting in Montreal, July 18, the following directors were chosen: James O'Halloran, H. S. Foster, Nathaniel Pettis, S. W. Foster, George C. Dyer, L. W. Miner, E. O. Brigham, E. L. Chandler, A. B. Foster, Jr., Charles H. Boright.

Spugen Deyell & Port Morris.—At the annual meeting in New York, July 10, the following directors were chosen: Samuel F. Barger, A. B. Baylis, Chauncey M. Depew, John B. Dutcher, Joseph Harker, W. H. Leonard, Robert J. Niven, Augustus Schell, Wm. H. Vanderbilt, Wm. K. Vanderbilt, Cornelius Vanderbilt, Frederick W. Vanderbilt, Wm. C. Wetmore. The road is leased to the New York Central & Hudson River.

United States Railroad Mutual Life Insurance Association.—At the annual meeting in Chicago, July 18, the following officers were chosen: President, Franklin Fairman; Vice-Presidents, F. Wild, Gershom Mott, Wm. Beadle, James Johnston, H. S. Depew; Secretary and Treasurer, Reynolds D. Keen; Executive Committee, John J. Neal, Charles D. Alexander, C. McKinley, James A. McMillan, James H. Wetmore; Finance Committee, Morton Mills, David McKnight, D. H. Mundy.

PERSONAL.

—Col. H. G. Prout, a young engineer who left this country a few years ago to accept a position as Major of Engineers in the Egyptian army, has been promoted to be Colonel, and for some months past has been Governor General of the Provinces of the Equator, the southernmost territory over which Egypt exercises dominion. Colonel Prout is now in London, and may perhaps visit this country before his return to Africa.

—Mr. Sanford Fleming, Chief Engineer of the Canadian Pacific and formerly of the Intercolonial, has gone to Europe on a twelve months' leave of absence. A report was current that he had left on account of a disagreement with the Board of Public Works, but Mr. Fleming has contradicted it in a published letter.

—Mr. G. R. Blanchard, Assistant to the Receiver of the Erie Railway, arrived last Saturday in New York from Europe, where he has been absent for the past two months. His health is much improved.

—Mr. Coleman Sellers, the eminent mechanical engineer of Philadelphia, of the firm of Wm. Sellers & Co., has been created by the King of Sweden a Knight of the order of St. Olaf, of which order the King is Grand Master.

TRAFFIC AND EARNINGS.

Texas Freight Rates.

The following circular has been issued:

"At a meeting of the Association of St. Louis and Texas General Freight Agents the following resolution was passed:

"Resolved, That tariff rates and conditions, as now existing, be strictly enforced on lumber, shingles, saw, doors and blinds, when such shipments are loaded together, the highest car-load class on either of these articles to be collected from point of shipment to destination. Excess of the weight allowed by the tariff to be charged for at first-class rates per 100 pounds.

"To take effect 1st of August, 1877.

"Resolved, That the rate on double-deck stock, to and from Texas, shall be ten (10) per cent. in addition to the rate on single-decks, and that 22,000 pounds or less shall be considered as a car load. Excess of 22,000 pounds shall be charged

first-class rates per 100 pounds. Cars to be double-decked by shippers at their own expense and risk.

"In effect August 1, 1877.

"Resolved, That tariff rates and conditions, as now existing, be strictly enforced, and that all excess of 24,000 pounds of beer and ice be charged for at first-class rates. All car-loads of these articles shall be weighed at Texarkana and Denison, and collections from shipping points shall be made. A clause covering the above shall be inserted in the bills of lading.

"To take effect July 20, 1877."

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending May 31:	1876-77.	1875-76.	Inc. or Dec.	P. c.
Raleigh & Gaston...	\$234,511	\$242,245	Dec.	\$7,734 3.2
Expenses.....	148,761	153,544	Dec.	4,783 3.1
Net earnings.....	\$85,750	\$88,701	Dec.	\$2,951 3.2
Earnings per mile.	2,418	2,497	Dec.	79 3.2
Per cent. of exps.	63.44	63.39	Inc.	0.05 0.1
Six months ending June 30:				
Philadelphia & Erie:				
Net earnings.....	\$1,389,863	\$1,565,721	Dec.	\$175,858 11.2
Net earnings.....	382,184	428,95	Dec.	46,765 10.8
Per cent. of exps.	72.49	72.63	Dec.	0.16 0.2
Wabash.....	1,985,763	2,086,118	Dec.	100,355 4.8
Net earnings.....	442,816	422,337	Inc.	20,479 4.8
Per cent. of exps.	77.69	79.75	Dec.	2.06 2.6
Five months ending May 31:				
Hanibal & St. Joseph:				
Net earnings.....	\$762,659	\$763,216	Dec.	\$557 0.1
Month of April:				
Col. Chi. & Indiana:				
Central.....	\$257,252			
Net earnings.....	15,243			
Per cent. of exps.	94.06			
Month of May:				
Hanibal & St. Joseph:				
Net earnings.....	\$162,719	\$141,289	Inc.	\$21,430 15.2
Second week in July:				
Atenison, Topeka & Santa Fe.....	\$46,081	\$48,331	Dec.	\$2,250 4.7
Den. & Rio Grande.	18,001			
St. Louis, Iron Mt. & Southern.....	87,300	65,136	Inc.	22,164 34.0
Two weeks ending July 13:				
Great Western, of Canada.....	\$134,830	\$139,016	Dec.	\$4,186 3.0
Two weeks ending July 14:				
Grand Trunk.....	\$330,772	\$331,374	Dec.	\$602 0.2

Coal Movement.

Tonnages for the week ending July 14 were as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Anthracite.....	456,911	401,601	Inc.	55,310 13.8
Semi-bituminous.....	33,676	74,608	Dec.	20,932 28.0
Bituminous and semi-bituminous tonnages for the six months ending June 30, not heretofore reported, were as follows:				
East Broad Top.....	25,427	34,766	Dec.	9,339 26.8
Belleville & Snow Shoe.....	21,819	28,278	Dec.	6,459 22.8
Allegheny Region, Pa. R. R.....	100,341	100,001	Inc.	340 0.3
Penn. and Westmoreland gas coal.....	370,220	371,162	Dec.	942 0.3
West Penn. R. R.....	94,063	98,247	Dec.	4,184 4.3
Southwest Penn. R. R.....	20,672	28,095	Dec.	8,023 28.0
Pittsburgh Region, Pa. R. R.....	184,514	150,131	Inc.	34,383 22.9
Totals.....	817,056	811,280	Inc.	5,776 0.7

The coal tonnages of the Pennsylvania Railroad and branches in Pennsylvania for the six months ending June 30 was:

The coal tonnage of the Pennsylvania State of Ohio for the calendar year ending June 30 was:			
	1877.	1876.	Increase, P. c.
Anthracite.....	322,906	322,494	412 0.
Semi-bituminous.....	770,251	738,911	31,340 4.
Bituminous.....	805,786	784,747	21,039 2.
Coke.....	398,275	393,158	5,117 1.
Totals.....	2,297,218	2,239,250	57,968 2.

The shipments of coal from the mines about Seattle, Wash. Ter, for the six months ending June 30 were: 1877, 58,798 tons; 1876, 53,138 tons; 1875, 26,845 tons; increase, 1877 over 1875, 31,953 tons, or 119 per cent. Nearly all this coal goes to San Francisco.

Grain Movement.

Receipts and shipments of grain of all kinds for the week ending July 14 were, in bushels:

	1877.	1876.	Inc. or Dec.	P. c.
Lake ports' receipts.....	2,550,086	2,628,445	Dec.	78,359 3.0
" shipments.....	3,341,924	2,877,186	Inc.	464,738 16.1
Atlantic ports' receipts.....	2,229,164	4,873,457	Dec.	2,644,293 54.3
Of the shipments from lake ports, 20 per cent was by rail this year, against 42% in 1876, 34% in 1875, and 8% in 1874.				
Of the receipts at Atlantic ports, 51.7 per cent was at New York, 15.3 at Philadelphia, 11.1 at Baltimore, 10.6 at Montreal, 9.8 at Boston, 1.3 at New Orleans, and 0.2 at Portland.				

Iron Ore Movement.

Shipments of iron ore from the Lake Superior Region up to June 30 were:

	1877.	1876.	Increase.	P.
From Escanaba, tons	154,444	102,144	52,300	21
From Marquette... ..	182,336	122,202	60,134	49
From L'Anse	24,885	15,964	8,921	55
Totals	361,665	240,310	121,355	50

The shipments this year show a very great gain over 1876. The largest shipments this year from any one mine were from the Republic Mine, 72,114 tons, shipped by way of Marquette.

THE SCRAP HEAP.

Railroad Manufactures.

We copied last week from a Cleveland paper a statement that the contract for the new bridge at Ashtabula, on the Lake Shore road, had been let to the King Iron Bridge Co. We are now informed that this statement was not correct, the contract having been let to the Keystone Bridge Co., of Pittsburgh.

The Terre Haute (Ind.) Car Works have a contract for 200 freight cars for the Missouri, Kansas & Texas road.

Bowler, Maher & Brayton, at Cleveland, O., now employ about 80 men on car wheels, car castings, chilled-plate railroad frogs and similar work.

Noble Brothers & Co., of Rome, Ga., are running their foundry on an order for car wheels for the Mobile & Ohio road.

The Portland Co., at Portland, Me., will have several of the European & North American locomotives to change from 5 ft. 6 in. to 4 ft. 8 1/2 in. gauge. The first one has been already received at Portland.

Anderson & Passavant, owners of the Pittsburgh Steel Works, have begun the erection of new works at Linden Station, on the Pittsburgh Division of the Baltimore & Ohio.

The Cambria Iron Works, at Johnstown, Pa., are putting in the foundation for a new steel blooming mill.

There are in Pittsburgh 33 iron and eight steel rolling mills, with 764 puddling furnaces and an annual capacity of 450,000 net tons.

The Catasauqua (Pa.) Manufacturing Co. started up its mill last week, after a stoppage of 10 days for repairs.

The annual meeting of the North Chicago Rolling Mill Co. was held in Chicago, July 16, when O. W. Potter was chosen President; S. P. Burt, Secretary; S. Clement, Treasurer. The report for the year ending June 30 gives the year's product at 38,205 tons steel rails, 18,995 tons iron rails and 38,865 tons pig iron. The gross receipts were \$3,342,094.64; surplus at close of year, \$658,241.50. It was voted to declare no dividend, but to retain the surplus as working capital.

Besides street railroad motors, the Baldwin Locomotive Works at Philadelphia are building a number of locomotives, including some for the Cincinnati Southern and some for an Indiana road.

The Mason Machine Works, at Taunton, Mass., recently delivered several engines to the New York & Manhattan Beach road.

The National Locomotive Works of W. H. Bailey & Co., at Connellsville, Pa., are building a mogul engine for the Salisbury Railroad, besides several smaller engines.

The Wythe Railway Speed Recorder has been adopted by the Cincinnati, Sandusky & Cleveland road, and is attached to all of the caboose cars of that road.

That Silver Spike.

The Boston Traveler is disturbed in its mind about a silver spike with which Governor Fairbanks, of Vermont, fastened down the last rail on the Vermont Division of the Portland & Ogdensburg road, and discourses thereof as follows:

"There is a great deal of curiosity to know something further about that silver spike that was driven by Gov. Fairbanks, on the occasion of the completion of the Portland & Ogdensburg Railroad. Was it paid for by Mr. Jewett, or was it bought on credit, or did the bondholders pay for it, or guarantee the payment? Then again there is some curiosity as to the future of that spike; will it be taken from the tie, as a silver plate is taken from the coffin, and be retained by the donors, or will it be sent to the mint and melted down into the coin of the realm and be used toward liquidating the floating debt of the corporation, or to provide for the interest on the bonds? These are some of the inquiries made by parties interested about that spike."

OLD AND NEW ROADS.

Alabama & Chattanooga.

In Montgomery, Ala., the representative of John Swain, trustee and purchaser of this road, paid into court the required installment of \$30,000 cash. The Court then ordered the deed of the property to be executed and delivered to the purchasers.

Bangor & Piscataquis.

This company has decided to change the gauge of its road from 5 ft. 6 in. to 4 ft. 8 1/2 in. as soon as the gauge of the European & North American is changed. The outlet of the road is over the European & North American, and it has no other connection, so that the change will be necessary. The road is 63 miles long, from Oldtown, Me., to Blanchard.

Camden & Atlantic.

This company has placed in the Permanent Exposition at Philadelphia an exhibit consisting of a large map of the road with descriptions of the climate, soil, etc., of the country along the line and specimens of the productions of the country. To these will be added from time to time, according to the season, special exhibits of fruit and other perishable products.

Central, of Iowa.

Receiver Grinnell reports that the earnings for the half-year ending June 30 were: 1877, \$260,465; 1876, \$342,020; decrease, \$81,555, or 23.8 per cent. The decrease in tonnage was 26 per cent., due chiefly to the very light grain shipments. The track is reported to be in good order and the expenses have been cut down by reducing both the number and wages of employees.

The foreclosure sale of the road is noted elsewhere.

Chicago, Millington & Western.

In the United States Circuit Court at Chicago, July 17, a bill was filed for the foreclosure of the mortgage on this road by the Farmer's Loan & Trust Company, trustee. The mortgage was executed Aug. 12, 1875, and is for \$1,500,000, but only \$50,000 bonds have been issued, on which interest is in default since Jan. 1, 1876. The road was intended to run from Chicago by Millington and La Salle to Muscatine, Ia., and is of 3 ft. gauge. The track has been laid for nearly two years from the west city line of Chicago west about 10 miles, but we believe that it has never been operated.

Chicago & Lake Huron.

In Detroit, Mich., July 10, the United States Circuit Court granted a decree of foreclosure under the mortgage of the Port Huron & Lake Michigan road, which covers the line from Port Huron to Flint, 66 miles, the decree being granted at the suit of the Union Trust Company, trustee. Subsequently a supplemental bill was filed by certain bondholders to set aside the decree and for leave to file a new complaint, making the Chicago & Northeastern Company also defendant. The bill also asked that the present Receiver, W. L. Bancroft, be removed and a new receiver appointed. The complaint in this bill alleged fraud in the management, to the detriment of bondholders' rights. It set forth that the Port Huron & Lake Michigan Company had acquired right of way for the 45 miles between Flint and Lansing and had done work to the amount of \$30,000, all of this property being covered by the mortgage; that a new company, the Chicago & Northeastern, was organized and took possession of this property without paying therefor; that this company had only a nominal amount of stock subscribed and built its road really at the expense of the Chicago & Lake Huron Company; and finally that a land grant of 36,000 acres had been disposed of in some manner unknown. The bill further asked that the Port Huron & Lake Michigan mortgage be decreed a first lien on this 45 miles of road from Flint to Lansing.

On July 17 the Court gave its decision, refusing to allow the relief asked for in the supplemental bill, on the ground that its allegations were not supported by proof, and that they were sufficiently disproved or explained. In order, however, to give an opportunity for bringing further proof, and also for examining the accounts of the Receiver, it was ordered that the foreclosure sale should not take place until the middle of September. The Court was also of opinion that the mortgage does not cover the Chicago & Northeastern road.

Cincinnati Southern.

All arrangements have been completed for the running of trains by the common carrier company; a number of cars have been received and trains will soon be put on. An additional order for 75 box and 25 stock cars has been given.

The stations as fixed, with the distances from Ludlow (opposite Cincinnati) are as follows: Kenton Heights, 5.2 miles; Greenwood Lake, 6.3; Dixon, 10.5; Richmond, 13.9; Walton, 17.1; Bracht, 20.9; Crittenden, 24.5; Sherman, 28.2; Dry Ridge, 31.5; Williamstown, 35; Mason, 39.4; Blanchet, 43.5; Corinth, 45.5; Hinton, 49; Sadeville, 53.5; Rogers' Gap, 60; Kinkaid, 62.5; Georgetown, 66.9; Donerail, 71.2; Greendale, 74.3; Lexington, 78.3; Providence, 84.9; Nicholasville, 90.3; Scott's, 95.2; Towers, 100; Burgin, 105.7; Harrodsburg Junction, 106.8; Danville, 113.3; Danville Junction, 117.7; Moreland, 123.4; McKinney, 128.2; South Fork, 133.2; King's Mountain, 136.1; Eubank's, 142.9; Science Hill, 150.3; Somerset, 157.5. One train daily will be run at first.

Chicago & Pacific.

Receiver Whitman reports for May and June as follows:

Balance, May 1.....	\$4,365 45
Receipts from all sources.....	34,185 61
Total.....	\$38,551 06
Disbursements.....	30,069 13

Balance, July 1.....\$8,479 91
The receipts exceeded the disbursements by \$4,116.45. The disbursements included \$1,079.16 for receivers' certificates and interest, and \$866.93 for old accounts of the company.

Dividends.

Dividends have been declared as follows:

- North Pennsylvania, 3 per cent., semi-annual, payable Aug. 1, in scrip convertible into stock.
- Railway Equipment Trust of Pennsylvania, 2 per cent., quarterly, payable Aug. 1.
- Car Trust of Pennsylvania, 1½ per cent., quarterly, payable Aug. 1.

Delaware Western.

The companies of this name, organized in Delaware and Pennsylvania by the purchasers of the Wilmington & Western road, have been formally consolidated, the name remaining unchanged. The consolidated company has been fully organized.

Eastern.

A writ of attachment has been served at the suit of this company on the property of the Portsmouth, Great Falls & Conway Company in New Hampshire, which is leased by the Eastern. The writ was served by the United States Marshal, and the suit is brought to recover advances made by the Eastern Company to pay interest.

Empire Transportation Company.

This company announces that it has withdrawn its business from the line of the Indianapolis, Bloomington & Western, the Indianapolis, Cincinnati & Lafayette, the Indianapolis & St. Louis and the Fort Wayne, Jackson & Saginaw roads. The business of the Empire Line from St. Louis, Peoria, Lafayette, Fort Wayne and other points heretofore served over the roads named will hereafter be done over the Wabash, the Toledo, Peoria & Warsaw and the Pekin, Lincoln & Decatur roads.

Foreclosure Sales.

Sales of railroad property under judicial process are noted as follows:

Central, of Iowa, at Marshalltown, Ia., July 19. Bought by the Farmers Loan & Trust Company, of New York, as trustee under the first mortgage, for \$5,192,390. The road is 189 miles long, from Albia, Ia., to Northwood; by the latest statement the bonds outstanding amounted to \$4,527,000, and the bid made appears to be intended to cover the amount of the bonds and unpaid interest. The road has been the subject of much controversy and litigation, and an appeal taken by some of the bondholders to the United States Supreme Court from the decree of foreclosure is now pending. Most of the bondholders agreed to a plan of reorganization some time ago, which will now probably be carried out.

The property of the **Great Southern Railway Company** was sold recently at Jessup, Ga., by the Receiver, under an order granted by the Georgia Circuit Court. The property consisted chiefly of some real estate and the right of way from Jessup southward to the Florida line. It was bought by Mr. Clary, of Jessup, for a trifling sum.

The foreclosure sale of the **New Jersey Southern** is again postponed, this time to Aug. 11.

Galena & Southern Wisconsin.

A dispatch from Dubuque, Ia., dated July 18, says: "The contractor doing work on this road was enjoined yesterday at the instance of the authorities of Platteville, Wis., and work was stopped. The owners of the road agreed to run it through Platteville, if the latter would give \$32,000, and now they want to run the line four miles from town."

Greenfield & Carrollton.

It is proposed to build a railroad from Greenfield, Ill., west by south to Carrollton, on the Jacksonville Division of the Chicago & Alton. The distance is about 10 miles.

Harlem Extension.

In the long pending suit to enforce the Park-Baxter mortgage against this road the Vermont Supreme Court, sitting at Rutland, has given its decision ordering that the road be delivered to the Union Trust Company as Trustee on Aug. 1. The mortgage dates from 1867, when Tremor W. Park and H. H. Baxter, then controlling the road, borrowed \$500,000 from Commodore Vanderbilt to complete the road to Chatham Four Corners, to connect with the New York & Harlem road. This loan was secured by a mortgage to the Union Trust Company as trustee, although in his defense the suit Mr. Park alleged that Commodore Vanderbilt had agreed to take stock for the loan. Default having been made in interest, the Trustee began suit to foreclose in 1870, and that suit has just been completed.

The road extends from Chatham Four Corners, N. Y., to Rutland, Vt., 114 miles, with a branch from Bennington to State Line, two miles. It has never been a prosperous line, the expenses having always nearly or quite equaled the earnings. It was included in the New York, Boston & Montreal consolidation, but, when that went to pieces, it was leased to the Central Vermont, which has worked it since Dec. 1, 1873. This lease will terminate Aug. 1, under the order of the Court, when the Trustee will take possession.

Illinois Central.

The Land Department reports for June sales of 320 acres for \$2,080. Cash collections on land contracts were \$6,016.19.

The Traffic Department reports earnings for June on the line in Illinois, 707 miles, as follows: 1877, \$360,234.42; 1876, \$511,282.92; decrease, \$151,048.50, or 29.3 per cent. The company's circular says:

"Wheat is cut in Southern Illinois, and is now harvesting towards the centre of the State—a large crop and of fine quality.

"The corn crop throughout the entire State stands well, except upon the extremely low land. The weather at the present moment is very favorable, and the most reliable reports we have from Illinois indicate a very satisfactory yield of wheat and other small grains, and a better promise for corn than for several years past.

"The traffic returns after August will probably show a better result than of late. This season, with the reduction of the tolls upon the Erie Canal and increased facilities for shipping grain by barges from Chicago East, the rates of freight by the lake and canal have been reduced to less than three-fourths the actual cost of transportation by rail, and we confidently expect that the present proportion of shipments by water will continue—nearly 90 per cent. by the lake this season in lieu of the 50 per cent. which has obtained for several years, during which period the Illinois roads centering at Chicago have suffered by the competition of the trunk lines.

"The directors have declared a dividend of 2 per cent. for the first half year. During this period the reduction in expenses has been nearly equal to the sum total of the falling off in the gross traffic."

Indianapolis, Bloomington & Western.

In the United States Circuit Court at Springfield, Ill., July 18, the final decree of foreclosure was ordered to be entered. It was ordered that the road be sold at Bloomington, Ill., on a day to be fixed hereafter.

Jacksonville, Pensacola & Mobile.

In the suit between the State of Florida and Daniel P. Holland, who claims to be owner of this road, a writ of error to the Supreme Court of the United States has been granted.

Keokuk & Des Moines.

This company has completed its new bridge over the Des Moines River at Des Moines, Ia., and last week attempted to lay its track from the bridge to the depot. This was forcibly resisted by the Des Moines & Fort Dodge Company, which desired to prevent the building of the bridge and now tries to

stop its use. The matter will have to be settled by litigation in the courts. The new bridge is a Pratt truss of iron, with five spans, 107 ft. 4 in. between centres of piers, and has cost about \$30,000.

Lake Superior & Mississippi.

In St. Paul, Minn., July 17, the United States Court ordered the entry of a decree for the distribution of the proceeds of the sale of the road among the creditors, and also a decree of judgment against the old company for deficiency in the amount needed. This last decree is formal, as probably nothing can be recovered from the old company.

Little Rock & Fort Smith.

The directors have issued a circular containing the following:

"Nearly a year has elapsed since the road was opened for traffic throughout its entire length, and the results of its operation and the sales of lands have been as follows:

From the 1st day of January, 1876, to the 1st day of April, 1877, the gross earnings were.....\$283,135
Operating expenses for same period, including extraordinary expenses for equipment, rebuilding bridges and repairing road, all charged against first year's business.....201,811

Net earnings, balance.....\$81,323

"The floating debt of the company on April 1, 1877, was \$170,040.18, against which are the bonds of the company remaining unsold, amounting to \$298,000, and some other asset not immediately available.

"From Dec. 10, 1874, when the present company took charge of the land department, to April 1, 1877, 60,300 acres of land were sold, at an average price of \$4.26 per acre, yielding \$256,877; from which, and from back payments due with interest on sales, there have been received in cash \$104,023. The expenses of this department during the same period have been \$69,192. *

"The total amount of contracts of sales of lands is \$219,670. These contracts bear interest at the rate of 6 to 10 per cent. and are payable in installments, the last installment maturing in five to six years from the date of each contract."

The circular also refers to discoveries of coal on the company's lands. The company has, however, no funds to meet the coupons on its mortgage bonds, and requests bondholders to fund the coupons for July 1, 1877, Jan. 1 and July 1, 1878, and Jan. 1, 1879, in scrip having 10 years to run, but payable sooner if the company has the means; the coupons to be held in trust as security for the payment of the scrip certificates.

Louisville, New Albany & St. Louis.

The United States Circuit Court at Springfield, Ill., has granted a final decree of foreclosure, at suit of the trustees, covering so much of this road as lies in Illinois. The Indiana end of the road was sold some time ago.

Memphis & Little Rock.

This road continues its war against the St. Louis, Iron Mountain & Southern and has reduced the fare from Little Rock to Louisville to the nominal rate of \$2, making the rate \$24 from Little Rock to New York. In retaliation the Iron Mountain road has given notice that the trains of the Memphis road will not be allowed to use its track and bridge over the Arkansas River to run into Little Rock. The Memphis trains are accordingly obliged to stop on the opposite side of the river.

Montreal, Portland & Boston.

This road is now completed to West Farnham, P. Q., 35 miles southeast from St. Lambert and 15 miles beyond the late terminus at Marieville. At the new terminus connection is made with the Southeastern Railway of Canada. Arrangements are being made for the further extension of 18 miles to the Vermont line near Freleighsburg.

Nashua & Plaistow.

The incorporators met in Nashua, N. H., last week, accepted the charter granted by the Legislature and organized the company. The road is to run from Nashua a little north of east to Plaistow, about 20 miles.

New York & Manhattan Beach.

The section of this road from East New York, N. Y., to Coney Island was opened for traffic July 18. It is about eight miles long and of 3 ft. gauge. There is also a branch about seven miles long to Bay Ridge, three miles of it built last year, which is operated in connection with a ferry between Bay Ridge and New York.

Paris & Danville.

It is stated that the various interests have at last agreed to unite in foreclosing the mortgage on this road, and that the necessary suit will be begun at once in the United States Circuit Court at Springfield, Ill.

Paulding & Cecil.

A correspondent informs us that the track on this road is laid from Paulding, O., to the canal crossing, five miles. The grading and bridging are all done and the ties are ready, so that the two miles of iron remaining to reach Cecil will be laid in a short time. The company has a locomotive, two passenger and five freight cars on the track. The line is from Paulding, O., north by west to Cecil on the Wabash road, seven miles.

Philadelphia & Erie.

Holders of Sunbury & Erie bonds which will mature Oct. 1, 1877, who desire to extend them for 20 years can do so by signing an agreement to that effect and depositing the bonds at the office of the Pennsylvania Railroad Company in Philadelphia, not later than Aug. 15. Bonds not extended will be paid at maturity.

Pittsburgh & Lake Erie.

This company, which purposes building a narrow-gauge road from Pittsburgh to Youngstown, O., by way of New Castle, has made an appeal to the merchants of Pittsburgh to take \$600,000 stock, which amount, it is stated, will secure the building of the road. Committees have been appointed to canvass the city for subscriptions.

Portland & Ogdensburg.

Trains will begin to run through over this lately completed road July 30. One through train each way will be run daily between Portland and Swanton, Vt., connecting at Cambridge, Vt., for Burlington. This train will also connect for Boston over the Portsmouth, Great Falls & Conway and the Eastern road.

Queens County.

In the suit brought by this company to restrain the city authorities of Brooklyn, N. Y., from taking measures to prevent the construction of the road through certain streets, the Supreme Court has decided that the organization has lapsed, the company having been formed under the general law in 1871, and having failed to begin work within five years from its organization, as required by the law. An appeal has been taken.

Rhode Island & Massachusetts.

It is understood that this road will be worked by the New York & New England as a branch, and that trains will be put on it in a few days. It is reported that the New York & New England is negotiating for the right to run its trains over the Providence & Worcester track from Valley Falls, R. I., to Providence.

St. Francis & Magantic International.

A conference was held in Bangor, Me., July 18, between representatives of this Canadian company and of the Bangor &

Piscataquis and the St. Croix & Penobscot companies of Maine. The object was to arrange for concerted action to secure the extension of the Magantic road across Maine to a connection with the Bangor & Piscataquis and also the completion of the three roads as a direct line from Ontario and Quebec to the Maritime Provinces. The parties concerned believe that the conference will result in some practical measures for securing the desired end.

St. Paul & Minneapolis.

It is proposed to build a new and direct line connecting St. Paul with Minneapolis, the distance being about eight miles. The road is to be a light road, operated with dummy engines and running frequent trains at a low fare.

San Francisco & North Pacific.

Articles of consolidation of this company, the Sonoma & Marin and the Fulton & Guerneville have been concluded and filed in California. The consolidation is merely formal, the San Francisco & North Pacific Company having built and always owned the Fulton & Guerneville road, while it purchased the unfinished Sonoma & Marin road some time ago.

Toledo & Delphos.

The track is laid on this narrow-gauge road from Delphos, O., on the Pittsburgh, Fort Wayne & Chicago, northeast five miles to Jennings.

Union Pacific.

A contract has been let for a new depot on the east side of the Missouri, near Council Bluffs, Ia., work to be begun at once. The building is to cost about \$100,000.

United States Railroad Mutual Life Insurance Association.

The annual meeting was held in Chicago July 18, with a full attendance of delegates. After opening the meeting President Fairman delivered his annual address, setting forth the objects and advantages of the association. Committees were then appointed and the reports read. The Secretary's report showed a total of 614 members. Receipts other than assessments during the year were \$1,935.71, and expenses \$1,750; there was collected and paid out of assessments \$15,572.06. The total amount of assessments collected and paid since the formation of the association was \$200,675.06.

Some amendments were made to the constitution, including one allowing delinquent members to be reinstated on paying up arrears, without penalty. After electing officers and appointing Nashville, Tenn., as the place for next year's meeting, the convention adjourned.

Washington & Ohio.

In the United States Circuit Court in Alexandria, Va., July 12, the suit of McComb and others for specific performance of contract was continued. The application for a Receiver was withdrawn on account of a technical error, some of the complainants being residents of the District of Columbia and not competent to sue in the Court. This application will, however, be renewed, but by agreement of counsel it will be postponed until after Aug. 21. In the meantime a call is issued for a meeting of bondholders, to be held in Alexandria, Aug. 21.

ANNUAL REPORTS.**Cincinnati & Muskingum Valley.**

This company owns a line from Dresden Junction, O., on the Pittsburgh, Cincinnati & St. Louis, west by south to Morrow on the Little Miami, 148.4 miles. It is leased to the Pittsburgh, Cincinnati & St. Louis, but a separate report is made, the latest being for the year ending Dec. 31, 1876.

The equipment consists of 14 engines; 10 passenger, 2 half-passenger and half-baggage and 4 baggage, mail and express cars; 55 box, 33 stock, 14 flat, 225 gondola, 28 hopper and 4 car boose cars. Three passenger cars are condemned; 2 baggage cars and 2 engines are reported as about worn out.

The liabilities are as follows:

Stock (\$26,336 per mile).....	\$3,997,320 00
First-mortgage bonds (\$10,108 per mile).....	1,500,000 00
Due lessee for advances.....	301,609 81
January coupons.....	53,500 00
Miscellaneous.....	159 39

Total (\$40,038 per mile).....\$5,941,589 20

The amount due lessee is the amount paid for betterments and for advances to pay coupons and cover deficits in earnings. It was increased by \$111,884.33 during the year, after giving credit for \$500 for real estate sold. The total amount due for betterments is \$5,455.15, the balance being for advances made.

The work done was as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Train mileage, passenger.....	194,925	202,700	Dec.	8,675 4.3
" " freight.....	292,725	237,500	Dec.	55,225 23.3
" " other.....	13,950	23,200	Dec.	9,250 39.9

Total.....	410,700	463,400	Dec.	52,700 12.8
Passengers carried.....	186,632	215,798	Dec.	29,166 15.6
Passenger mileage.....	3,625,689	4,229,265	Dec.	603,576 16.3
Tons freight carried.....	192,788	206,373	Dec.	13,585 7.0
Tonnage mileage.....	9,775,811	11,389,147	Dec.	1,613,336 13.7

Av. pass. train load No.....	18.69	20.86	Dec.	2.17 10.4
Av. freight train load, tons.....	48.22	47.71	Inc.	0.51 1.1
Av. receipt per train mile.....	\$0.8125	\$0.9001	Dec.	\$0.0876 9.7
Av. cost per train mile.....	0.8311	0.8189	Inc.	0.0122 1.5

Av. receipt per pass. per mile.....	2.810 cts.	2.880 cts.	Dec.	0.070 ct. 2.4
Av. cost per pass. per mile.....	3.979 "	3.587 "	Inc.	0.422 " 11.9
Av. receipt per ton per mile.....	3.110 "	2.270 "	Dec.	0.160 " 7.1
Av. cost per ton per mile.....	1.897 "	1.853 "	Inc.	0.044 " 2.4

Of the tonnage mileage 14.2 per cent. was of through freight, on which the average rate was only 0.93 cent. per ton per mile. Of the tons carried over 41 per cent. were coal, that class of traffic showing an increase. The earnings for the year were:

	1876.	1875.	Inc. or Dec.	P. c.
Freight.....	\$206,033 34	\$257,780 73	Dec.	\$51,747 39 20.1
Passengers.....	101,794 28	121,844 33	Dec.	20,050 05 19.5
Express, mail, etc.....	14,831 48	16,602 17	Dec.	2,070 69 12.5

Total.....	\$322,659 10	\$395,227 23	Dec.	\$72,568 13 18.6
Working expenses.....	329,743 43	360,482 60	Dec.	30,739 17 8.5

Net earnings.....	\$7,384 33	\$35,744 63	Dec.	\$28,360 30 386.1
Gross earn. per mile.....	2,142 23	2,670 00	Dec.	\$527 77 18.6
Net.....	240 87	240 87	Inc.	0.000 0.0
Per cent. of exps.....	102.0	90.9	Inc.	11.1 12.2

The income account was as follows:

Deficit in earnings.....	\$7,384 33
Expenses of organization.....	1,123 23
Interest on bonds.....	105,000 00

Loss for the year.....	\$113,807 56
Debtor balance from previous year.....	217,106 21

The income account was as follows :	
Deficit in earnings.....	\$7,384 35
Expenses of organization.....	1,123 25
Interest on bonds.....	105,000 00

The business suffered from general depression and the prevalence of low rates. The expenses are large, chiefly because the equipment is insufficient and in very poor condition, the shops dilapidated beyond repair and the tools insufficient, and of poor and obsolete patterns. The road also has a great many bridges, requiring constant outlay.